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THE LICHEN GENUS *PHYSICIA* AND
ALLIED GENERA IN FENNOSCANDIA

BY
ROLAND MOBERG



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ACTA UNIVERSITATIS UPSALIENSIS

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Abstract Moberg, R. 1977. *The lichen genus Physcia and allied genera in Fennoscandia*.—Symb. Bot. Upsal. XXII:1.

The lichen genera *Phaeophyscia*, *Physcia*, *Physciopsis* and *Physconia* in the countries Sweden, Norway, Finland and Denmark are treated.

The gross morphology, the chemistry, the distribution and the habitat are discussed. A scheme for related species is proposed. The delimitation of the genera is discussed and a key to the taxa treated is presented. A new genus, *Phaeophyscia*, and a new section of *Physcia*, *Fusisporae*, are described.

Twenty-three species and three varieties are recognized within the area under examination. Maps for 21 species and 2 varieties are presented in connection with the species.

New combinations are *Phaeophyscia ciliata* (Hoffm.) Moberg, *Ph. constipata* (Norrl. et Nyl.) Moberg, *Ph. endococcina* (Kbr.) Moberg, *Ph. endophoenicea* (Harm.) Moberg, *Ph. kairamoi* (Vain.) Moberg, *Ph. nigricans* (Flk.) Moberg, *Ph. orbicularis* (Neck.) Moberg, *Ph. sciastra* (Ach.) Moberg, *Physcia semipinnata* (Gmelin) Moberg, *Physconia perisidiosa* (Erichs.) Moberg and *Physconia* sect. *Griseae* (Poelt) Moberg.

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INTRODUCTION

During a lichenological excursion to Varanger Peninsula (Norway) in 1966 I was introduced on the initiative of Professor R. Santesson, to some problems concerning the genus *Physcia* in the Scandinavian Mountains. A year later I started an investigation of some critical species and I also visited Torne Lappmark (Sweden) and Lycksele Lappmark (Sweden) for field studies. Later I have visited other areas in the Scandinavian Mountains e.g. Oppland, Sör-Tröndelag (both Norway) and Härjedalen (Sweden).

From the examination of collected and existing herbarium material I soon became aware that the investigation had to be extended to the whole of Fennoscandia (cf. chapter Distribution and Habitat) and field studies have subsequently been carried out in various parts of the area.

The knowledge of the genus *Physcia* s. lat. in the Nordic countries was mainly based on the monographic treatment of the Norwegian species by Lynge (1916), supplemented by his survey of the Central European species (1935). As my examination advanced I was soon convinced that several described taxa were nothing but modifications, and that a renewed monographic treatment of the species in Fennoscandia was necessary.

Just before my study begun a new genus (*Physconia*) had been separated from *Physcia* s. lat. by Poelt (1965) and it was very stimulating to extend the examination to include also this genus.

Interesting records have been published as the examination advanced (Moberg 1969, 1971, 1974 and 1975) and, to supplement the present monographic treatment, are partly included here. Due consideration has also been given to material and species from the rest of Europe and North America.

Material and methods

The present study is based on both field and

herbarium studies. Approximately 20,000 specimens from various herbaria have been examined and according to the abbreviations in Index Herbariorum I (1974) these are as follows: AAU, ANGUC, BERN, BG, BM, BRA, C, FH, G, GB, H, HBG, KUO, L, LD, LE, M, O, OULU, P, PRC, PRM, S, TRH, TROM, TUR, UPS and UPSV. The private herbarium of Gunnar Degelius (Degel.) has also been investigated. The material collected by me (about 800 specimens) is preserved separately in UPS (herb. Mob.). All collections seen from the area studied have not been cited with their respective localities. For the most common species only the number of collections from each province has been given, and a more detailed list is deposited at UPS and S. For the delimitation of the area examined and the subdivision of countries into provinces see Chapter Distribution and Habitat. Records of species in literature have not been considered unless the corresponding material has been examined.

Light Microscopy (LM) was carried out on 15 μ m thick sections cut on a freezing microtome and stained with Lactic Blue (Lactophenol with Cotton Blue). On some occasions only Lactophenol or distilled water was used. For routine examinations sections cut by hand with a razor blade (thin) proved sufficient. Spore studies have usually been made on squash preparations of hand-sectioned parts of apothecia, and all measurements have been recorded in water without staining. For the study of surface structures staining with Lactic Blue and heating was necessary.

Transmission Electron Microscopy (TEM) was made on material fixed in 2 % OsO_4 , stained with 2 % uranylacetate in 70 % ethanol and after dehydration in ethanol and propylene oxide embedded in Epon. The material was sectioned with glass knives and examined with an Akashi TRS-50 electron microscope.

Scanning Electron Microscopy (SEM) was

carried out on parts of thallus or apothecia coated with gold under vacuum. The examination was made in a JEOL JSM-U3 Scanning Electron Microscope operating at 15–25 kV.

Thin Layer Chromatography (TLC) was performed in accordance with the method of Culberson and Kristinsson (1970) and Culberson (1972). A great number of specimens of each taxon have been examined except for rare taxa where at least five specimens have been examined. Type material has been examined unless the opposite is noted in the text.

History

The genera treated in the present work have all been included in the "old" genus *Physcia*. The publications of the genera *Physciopsis* and *Physconia* were made only recently (see below) and the genus *Phaeophyscia* is proposed in this paper.

The history of the genus *Physcia* s. lat. was reviewed by Thomson (1963) and his work is referred to, except for the origin of the name *Physcia*. Already in 1803 Michaux treated *Physcia* at the generic level (see Chapter Taxonomy).

The genus *Physciopsis* was described by Choisy (1950:20) although later authors, e.g. Thomson (1963) and Frey (1963), still treated it as subgenus *Macrosperma* of the genus *Physcia*. Not until 1965 in the study of the family Physciaceae by Poelt, has its generic status been generally accepted.

The genus *Physconia* was proposed by Poelt in 1965 and with only a few exceptions the genus has been accepted by later authors.

An earlier monographic treatment of *Physcia* s. lat. in the area examined was published by Lynge (1916), and the brown species were also treated by Du Rietz (1925).

MORPHOLOGY

Thallus

Anatomy of the Thallus. The different strata which are characteristic of a heteromerous thallus are present in all the examined species, and the structure of the various layers is of importance in the separation of some related species.

ALGAL LAYER. In some species this layer is more irregular in thickness than in others (Fig. 1 A) and usually this irregularity is visible on the upper side as a characteristic maculation, e.g. *Phaeophyscia aipolia* and *Ph. caesia* (Fig. 1 B). However, other species which usually lack such a maculation may on some occasions be weakly maculated and the character should therefore be used with care.

MEDULLA. Without exception the medulla consists of loosely interwoven hyphae (Fig. 1 C) and there seems to be no difference between the examined species. The presence or absence of pigments is in some occasions of importance for the separation of related species e.g. *Phaeophyscia endophoenicea* and *Ph. orbicularis*.

UPPER AND LOWER CORTEx. The variation in the structure of these layers between the various species has been widely used as a key character

to separate species with the same appearance. However, the terminology of the hyphal tissues is highly confusing and the three types present in the examined species are defined as follows:

prosoplectenchymatous—elongated cells (hyphae) (Fig. 1 D),

paraplectenchymatous—more or less isodiametric cells (Fig. 1 E),

scleroplectenchymatous—thick-walled, strongly conglutinated cells (Fig. 1 F).

To some extent the cortical structures may be used to characterize the genera *Phaeophyscia*, *Physcia* and *Physconia*, even though transitional states are present (Table 1).

Apparently the paraplectenchymatous type of upper cortex is present in all three genera, but there is a small difference between the cells of the various genera. In *Phaeophyscia* the cells are always almost isodiametric (Fig. 2 A), but in the other two genera there is a variation from $\pm$ isodiametric to $\pm$ angular cells (Fig. 1 E and 1 C). The scleroplectenchymatous type is present only in *Physconia* (Fig. 1 F) and a prosoplectenchymatous upper cortex has not been found in any of the genera treated. Such a cortex is characteristic of the genus *Anaptychia* s. lat.

Table 1. Hyphal structure of upper and lower cortex of the genera *Phaeophyscia*, *Physcia* and *Physconia*.

	<i>Phaeophyscia</i>	<i>Physcia</i>	<i>Physconia</i>
upper cortex	paraplectenchymatous	paraplectenchymatous	paraplectenchymatous or scleroplectenchymatous
lower cortex	paraplectenchymatous; cells isodiametric and thick-walled. Rarely prosoplectenchymatous	prosoplectenchymatous. Rarely paraplectenchymatous	prosoplectenchymatous or lacking

The differences between the structures of the lower cortex are more pronounced although none of the genera have a unique structure. The paraplectenchymatous type predominates in *Phaeophyscia* (Fig. 2 A) but is rare in *Physcia*; the European (but not Fennoscandian) species *Ph. tribacia* (Ach.) Nyl. serving as an example (Fig. 2 B). From Figs. 2 A and 2 B it is also obvious that the cells of *Phaeophyscia* are more thick-walled. A prosoplectenchymatous lower cortex is present in *Physcia* (Fig. 1 D) and *Physconia* (Fig. 2 C) although there is a prominent difference in the thickness of the walls, being thicker in *Physconia*.

These differences in lower cortex structure have earlier been pointed out by Hale (1976) but the new genus *Phaeophyscia* has not been founded on cortical structure even though this supports the separation of the genus (see below).

Rhizinae. Rhizinae are present in all examined species but there is a considerable variation in

the number, both within and between the different species. Two types are recognized; simple and squarrose.

Simple rhizinae are characterized by unbranched bundles of hyphae which are usually clearly delimited. In the genera *Physcia* s. str. and *Phaeophyscia* the rhizinae are narrow and well delimited (Fig. 2 D). In *Physciopsis adglutinata* they are irregular and usually difficult to recognize (Fig. 2 E), and possibly should not be called true rhizinae. *Physconia grisea* differs from other *Physconia* species (see below) in having $\pm$ simple rhizinae, which is one of the main reasons for the separation of this species into a section of its own.

Squarrose rhizinae (Fig. 2 F) are typical for *Physconia* section *Physconia* and are characterized by the tips of hyphae forming more or less right-angled branches, which are distributed over the rhizinae. The term squarrose rhizinae was introduced by Hale (1967) and is preferred

Fig. 1. A. Longitudinal section of lobe showing irregular algal layer. *Physcia caesia*, Sweden, Vg, Magnusson 17871 (UPS). B. Maculation of thallus. *Physcia aipolia*, Norway, Opl, Moberg 1623b (UPS, herb. Mob.). C. Longitudinal section of lobe. *Physcia magnussonii*, Norway, Opl, Moberg 1231 (UPS, herb. Mob.). D. Longitudinal section of lobe showing prosoplectenchymatous lower cortex. *Physcia tenella* var. *marina*, Sweden, Bh, Santesson 23747 (UPS). E. Longitudinal section of lobe showing paraplectenchymatous upper cortex. *Physconia grisea*, Sweden, Gtl, Moberg, 1175a (UPS, herb. Mob.). F. Longitudinal section of lobe showing scleroplectenchymatous upper cortex. *Physconia pulverulenta*, Sweden, Dlr, Moberg 1153b (UPS, herb. Mob.).

Fig. 2 (next page). A. Longitudinal section of lobe showing cortex of isodiametric cells. *Phaeophyscia orbicularis*, Sweden, Sk, Magnusson 13760 (UPS). B. Longitudinal section of lobe showing paraplectenchymatous lower cortex. *Physcia tribacia*, England, Sethwey (UPS). C. Longitudinal section of lobe showing prosoplectenchymatous lower cortex. *Physconia perisidiosa*, Sweden, Upl, 1926 Degelius (UPS). D. Longitudinal section of rhizinae. *Physcia tenella* var. *tenella*, Sweden, Vsm, Nordin 2885 (UPS). E. Longitudinal section of lobe. *Physciopsis adglutinata*, Sweden, Bh, Moberg 2329 (UPS, herb. Mob.). F. Longitudinal section of rhizinae. *Physconia muscigena*, Sweden, Hjr, Moberg 1008 (UPS, herb. Mob.).

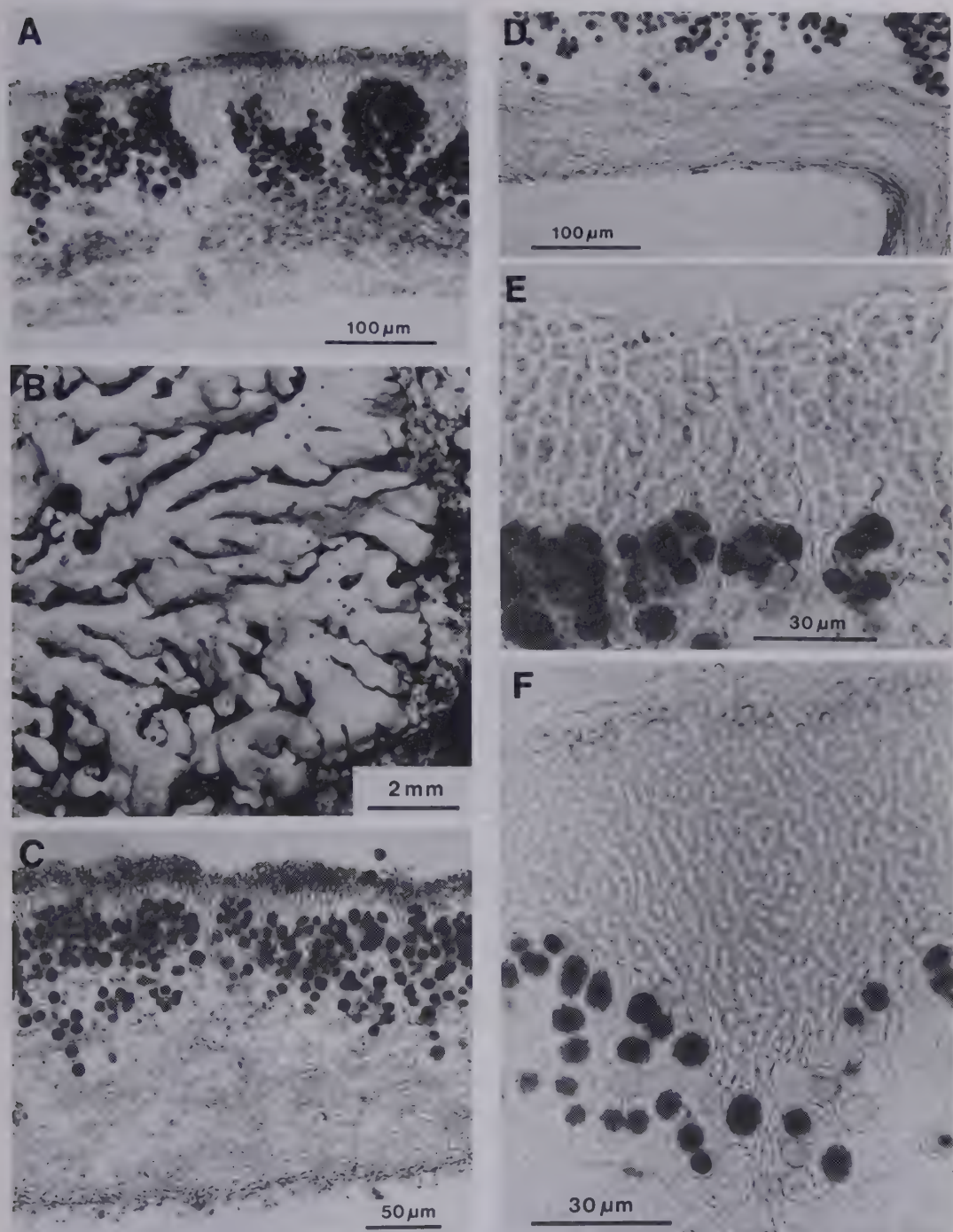
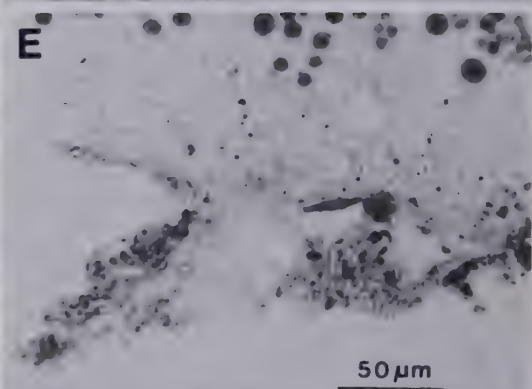
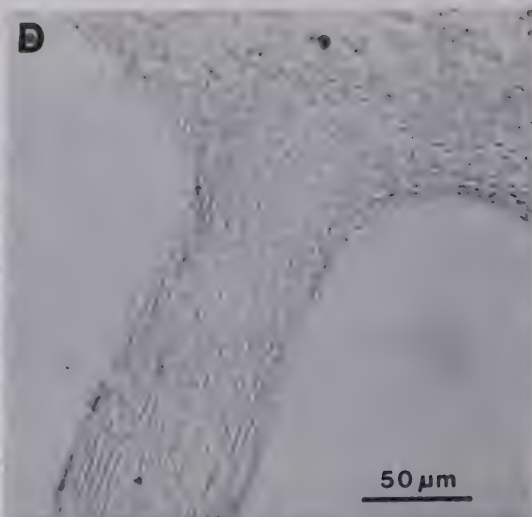
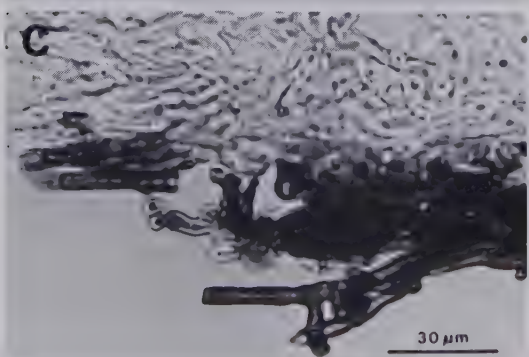
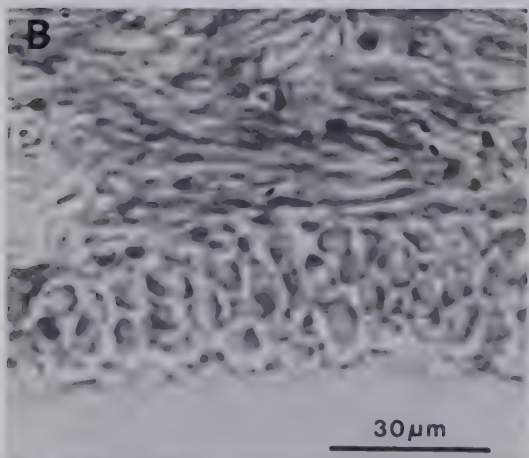
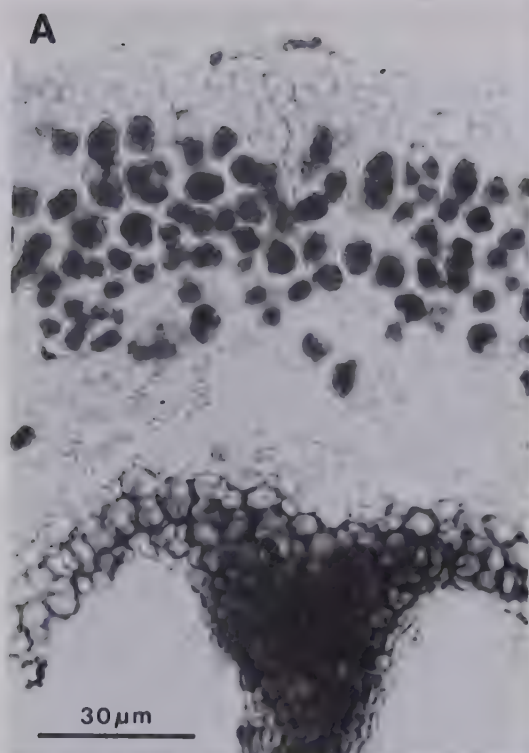


Fig. 1.



here instead of the "Pfeifenputzerrhizinen" proposed by Hannemann (1973).

Cilia. Cilia are present only in *Physcia* section *Physcia* and are regarded as one of the main characters of that Section (Fig. 6 and 26). Usually the cilia are easily separated from rhizinae but some material of non-ciliate species seems to have caused difficulties in this respect. For example, narrow-lobed *Physcia stellaris* with long rhizinae projecting beyond the margins (Fig. 3) has often been misidentified as *Ph. semipinnata*. Cilia are usually used in determination keys and it is important to state whether the structures are emerging from the lobe-margin (cilia) or from the underside (rhizinae).

Soralia. The different types of soralia within *Physcia* s. lat. have been discussed by Nádvorňík (1947), Frey (1963) and Thomson (1963). The latter directly applies the types proposed by Du Rietz (1924), whereas Nádvorňík and Frey, even though they do not cite Du Rietz, complete his types by adding others characteristic of some species not treated by him. Here the terminology of Jahns (1974) is followed and discussed.

MACULIFORM SORALIA (Fig. 4)—initiated as small dot-like openings in the upper cortex which soon extend and may sometimes cover larger areas. They occur in *Physciopsis adglutinata* and some modifications of *Phaeophyscia*

orbicularis. Also a modification of *Physcia dubia* seems to carry this type of soralia, but in that case the openings are a result of the disappearance of apothecia and/or pycnidia.

RIMIFORM SORALIA—are developed from cracks or fissures in the upper cortex. Typical examples of such soralia are not present within the treated species, although the very special laminal soralia of *Physcia caesia* (Fig. 5 A, B), called crateriform by Thomson (l.c.), may be included.

CONVEX-GLOBULAR SORALIA (capitate, Fig. 5 C, D)—characterized by more or less globose formations either at the ends of lobes or on laminal parts of the thallus. Common in *Physcia caesia* and *Phaeophyscia orbicularis*.

LABRIFORM SORALIA (lip-shaped, Fig. 5 E, F)—may be regarded as a special type of marginal soralia (see below), formed at the lobe-tips and usually causing the upper cortex to curl upwards or even backwards. If the lower cortex is well developed the tips are split into two lips, as indicated by the name. They occur in *Phaeophyscia endophoenicea*, *Physcia caesia*, *Ph. dubia*, *Ph. tenella* and *Physconia perisidiosa*.

FORNICIFORM SORALIA (helmet-shaped, Fig. 6 and 23)—are also formed at the lobe-tips, but instead of being reflexed, the upper cortex becomes inflated (helmet-shaped), carrying soredia inside. They are only found in *Physcia adscendens*. Occasionally the soralia of *Ph. tenella* var. *marina* may be weakly inflated.

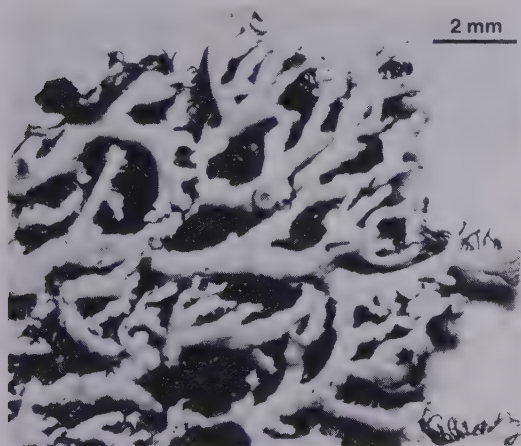


Fig. 3. Lobes with rhizinae projecting beyond the margins. *Physcia stellaris*, Norway, Trs, Norman (UPS).

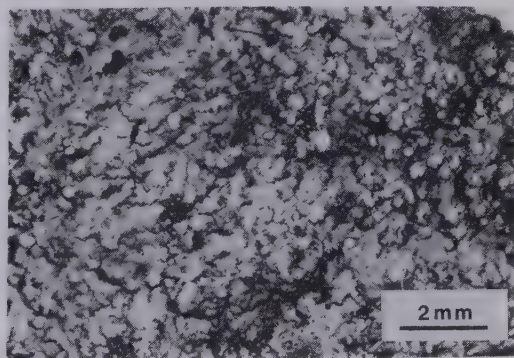
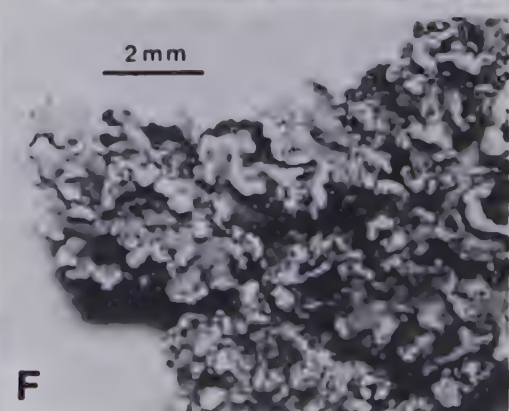
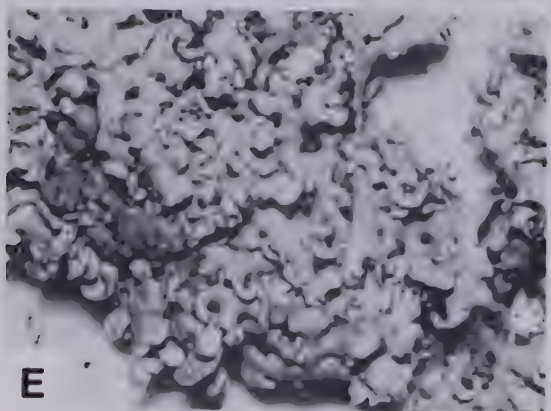
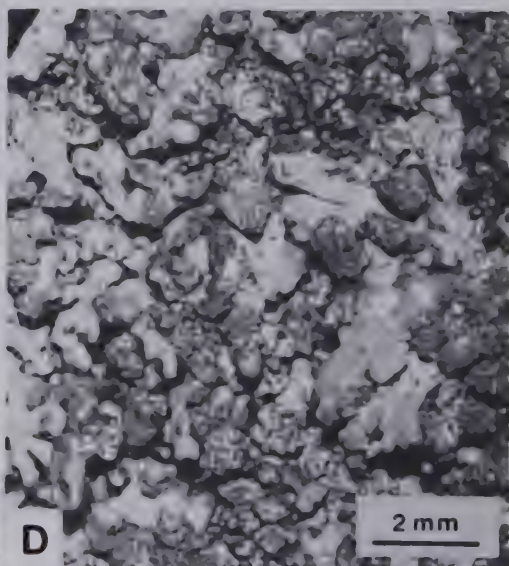
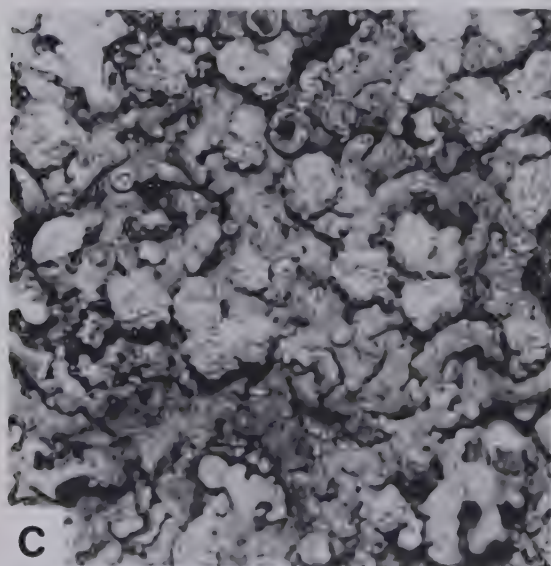
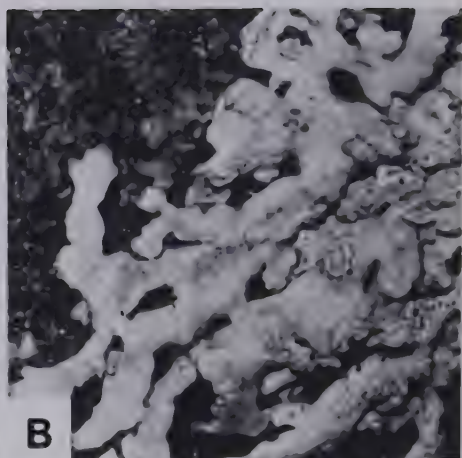
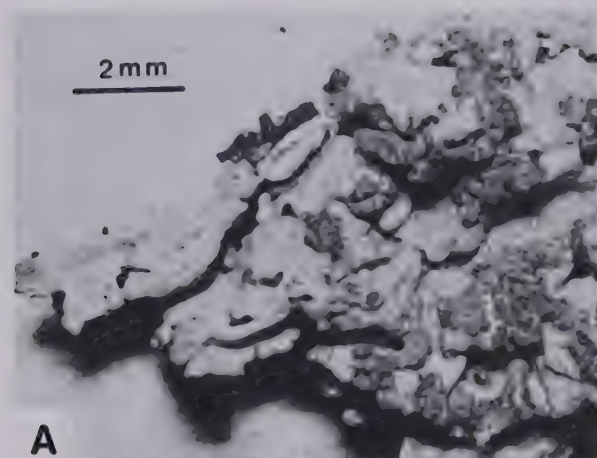


Fig. 4. Thallus with maculiform soralia. *Physciopsis adglutinata*, Sweden, Gtl, 1918 Du Rietz (UPS).



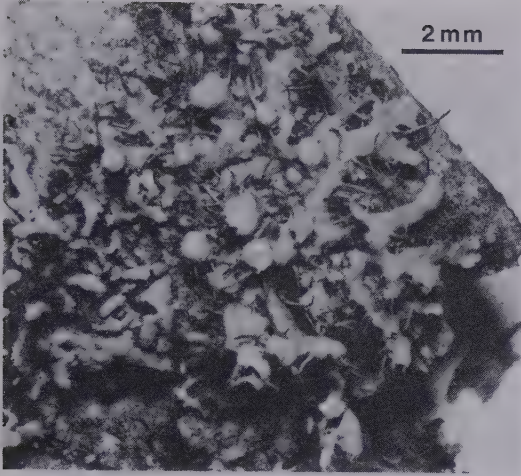


Fig. 6. Forniciform (helmet-shaped) soralia. *Physcia adscendens*, Sweden, Vsm, Moberg 3037 (UPS, herb. Mob.).

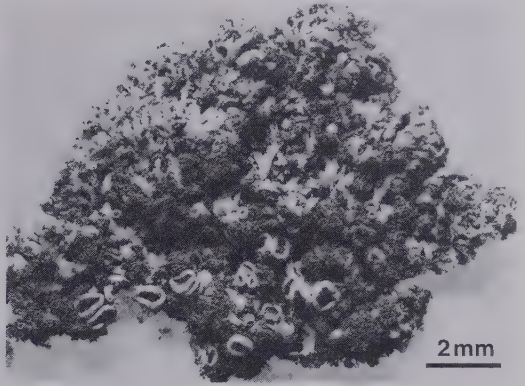


Fig. 8. Granular isidia. *Phaeophyscia sciastra*, Norway, STrd, Moberg 1087a (UPS, herb. Mob.).

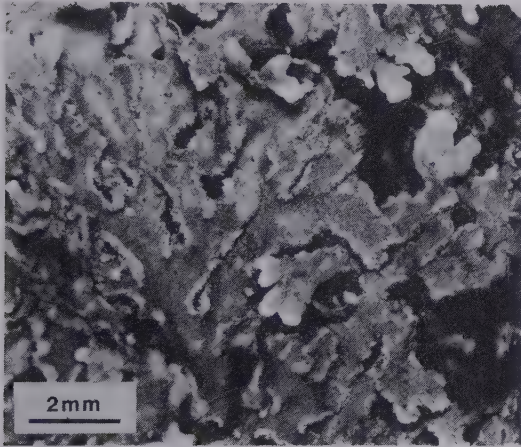


Fig. 7. Marginal soralia. *Physconia enteroxantha*, Sweden, Vsm, Moberg 2983 (UPS, herb. Mob.).

MARGINAL SORALIA (Fig. 7)—formed along the margins of the lobes, sometimes also including the lobe-tips. Well developed in *Physconia detera* and *Ph. enteroxantha* but occur also in *Physcia dimidiata*, which has granular, almost isidiose soredia.

Isidia. A granular type of isidia (Fig. 8) seems to be the only type present among the species examined. Four species are isidiate, viz. *Phaeophyscia kairamoi*, *Ph. nigricans*, *Ph. sciastra* and *Physconia grisea*. *Ph. sciastra* and *Ph. kairamoi* have traditionally been considered isidiate, but in the latter it is difficult to separate isidia from the lobules typical of that species. *Ph. nigricans* and *Ph. grisea* also have to be regarded as isidiate although in these cases the isidia very often break up into soredia. In *Ph. dimidiata* v. *ornata* the lobe-tips are usually crenulate but such protuberances could hardly be accepted as true isidia (Fig. 33).

Fig. 5. A–B (same magn.). Thalli with crateriform soralia. *Physcia caesia*. A. Norway, Opl, Moberg 1616b (UPS). B. Sweden, Upl, Moberg 2391 (UPS, herb. Mob.).

C–D (same magn.). Convex-globular (capitate) soralia. C. *Physcia caesia*, Sweden, Vsm, Moberg 3033 (UPS). D. *Phaeophyscia orbicularis*, Sweden, Ång, Moberg 240 (UPS, herb. Mob.).

E–F (same magn.). Labriform (lip-shaped) soralia. E. *Physcia dubia*, Sweden, Ång, Moberg 110a (UPS). F. *Physconia perisidiosa*, Sweden, Vsm, Moberg 2987 (UPS, herb. Mob.).

Apothecia

Apothecia are found in all Nordic species of the genera treated except for *Physcia dimidiata*. There is a considerable variation in the frequency, and with one exception (*Phaeophyscia constipata*) the nonsorediate/nonisidiate species are all richly fertile. Of the sorediate/isidiate species apothecia are extremely rare in *Phaeophyscia endophoenicea* and *Physconia deterosa* and rare in *Ph. enteroxantha* and *Ph. perisidiosa*. All other species are more or less regularly provided with apothecia.

Without exception the apothecia are laminal. They are either shortly stalked (e.g. *Physcia tenella*) or sessile (e.g. *Physcia aipolia*). The size is very variable both within and between the species, with a maximum diameter ranging from 1 mm (*Physciopsis adglutinata*) to 5 mm (*Physconia pulverulenta*). In all species the apothecia are characterized as lecanorine and the margin is either entire (e.g. *Phaeophyscia ciliata*), crenulate (e.g. *Phaeophyscia endococcina*), sorediate (e.g. *Physconia enteroxantha*) or more or less lobate (e.g. *Physconia pulverulenta*). In most species of *Phaeophyscia* the lower side of the apothecia is often provided with rhizinae, to form what is sometimes called a "corona" (Fig. 9 and 19). The colour of the disc varies from brown to almost black, but in some species, especially those of the genus *Physconia*, the colour is masked by a more or less dense white pruina.

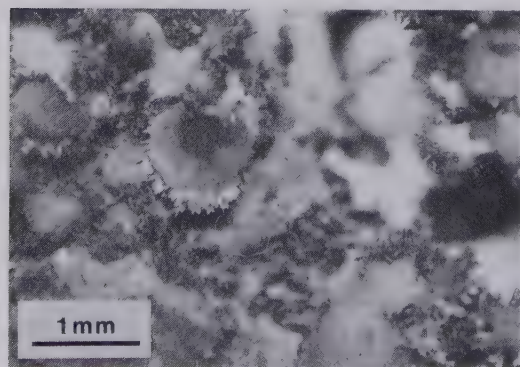


Fig. 9. Apothecium with "corona". *Phaeophyscia kairamoi*, Sweden, Hrj, Moberg 999 (UPS, herb. Mob.).

The hymenium, formed of asci and paraphyses (Fig. 10A), is colourless except for the uppermost brown part. The thickness usually ranges from 80 to 100 μm except in the genus *Physconia* where the thickness is usually 100 to 150 μm . The paraphyses are normally thickened, septate, brown, and $\pm$ branched in the upper part (Fig. 10B); the brown tips forming the colour of the disc. The asci are clavate and usually 3/4 of the height of the hymenium and normally 8-spored.

The thickness of the hymenium and the shape and size of the asci and paraphyses have not been found of importance in the separation of closely related species or subspecific taxa.

The spores are elliptic, brown and 1-septate, with a considerable variation in size and shape. At least two types have been recognized in the species examined; one of which is important in the delimitation of the genus *Physconia*. In his work on the family Physciaceae, Poelt (1965) named them "Physcia-Type" and "Physconia-Type". The spores of the Physcia-Type were characterized as having the wall thickened at the ends and at the septum leaving a sand-glass shaped lumen (Fig. 11 D). The spores of the Physconia-Type were characterized as being bigger the thickening of the spore-wall as more regular and the surface of the spore as more distinctly verrucose.

This is confirmed by the study of the spore ontogeny of various species. In Fig. 11A and Fig. 11B series of the two types is presented. When compared, the very young and very old states are similar but the ripening process is quite different. In the Physcia-type the ripening starts with a thickening of the wall, both at the ends and at the septum (Fig. 11A), whereas the thickening of the wall in the Physconia-type is more regular (Fig. 11B). At the septum in the Physconia-type the thickening is very characteristic (Fig. 11B). A certain difference in the thickness of the wall still exists in the almost ripe spores (Fig. 11 Ad and 11 Bd) but gradually these differences disappear as their size increases (Fig. 11 Ae-g, 11 Be-f).

Poelt (l.c. p. 23) also discusses the surface

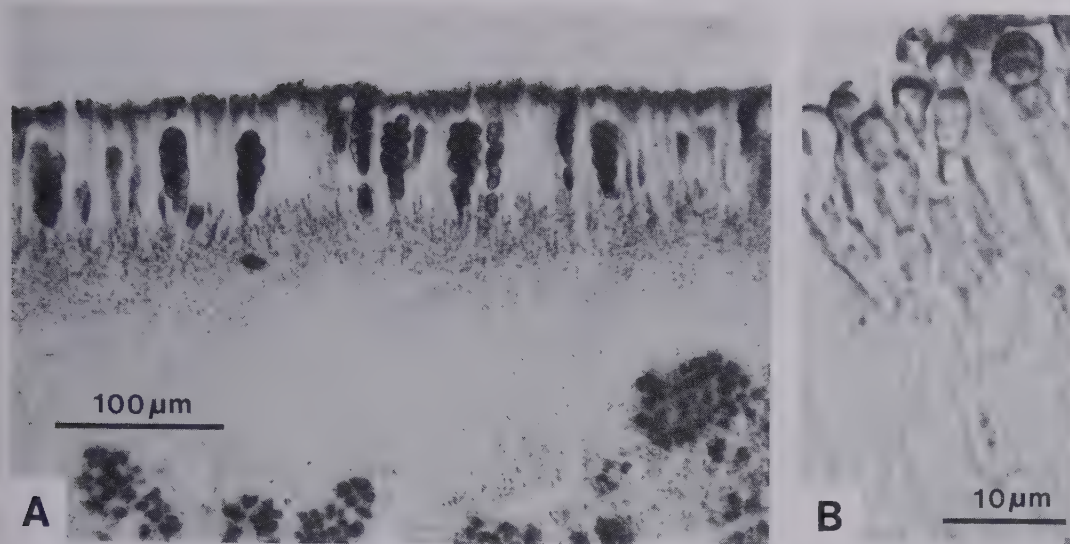


Fig. 10. Cross-section of apothecium. A. Hymenium, *Physcia caesia*, Sweden, Vg, 1858 Graeve (UPS). B. Paraphyses, *Phaeophyscia sciastra*, Sweden, Hvj, Moberg 1009 (UPS, herb. Mob.).

structure of the spores, suggesting that the *Physconia*-type has a pronounced warty structure compared to the weakly roughened structure of the *Physcia*-type. In LM this is true (Fig. 11D and 12E) but the difference could be explained by the difference in spore size, especially since the spore surface of *Physcia magnussonii* (Fig. 11E) in this respect seems to be closer to the *Physconia*-type (Fig. 12E). In TEM micrographs (Fig. 12C, D) the two spore-types appear to have the same kind of wall structure, but examination in SEM reveals a slight difference in surface structure (Fig. 12A, B). The surface structure of the *Physcia*-type may be described as rugulose with short irregular ridges, whereas that of the *Physconia*-type is a fine, irregular reticulation of shallow furrows. In short, the structure of *Physcia*-type is formed by elevations on the surface but that of *Physconia*-type by depressions in it.

The spores of *Physcia magnussonii* seem to differ from the typical *Physcia*-type in being more narrowly ellipsoid and in having a pronounced surface structure easily visible in LM (Fig. 11E). However, the spore ontogeny (Fig. 11C) agrees

very well with the *Physcia*-type and there is no reason to treat the spore-type of *Ph. magnussonii* apart from the true *Physcia*-type.

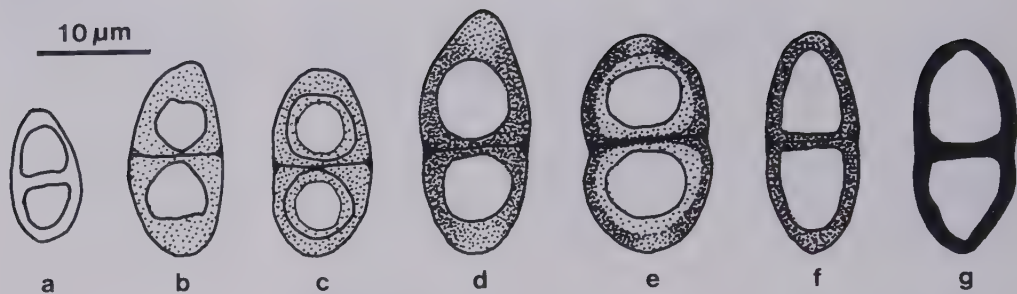
Pycnidia

Pycnidia have been found in all Nordic species of *Phaeophyscia*, *Physcia*, *Physciopsis* and *Physconia* except for *Physcia dimidiata*. In some species they are common (e.g. *Physcia aipolia* and *Phaeophyscia orbicularis*) and in others they are rare (e.g. *Phaeophyscia constipata* and *Physconia detera*). The frequency seems to be closely correlated with the occurrence of apothecia.

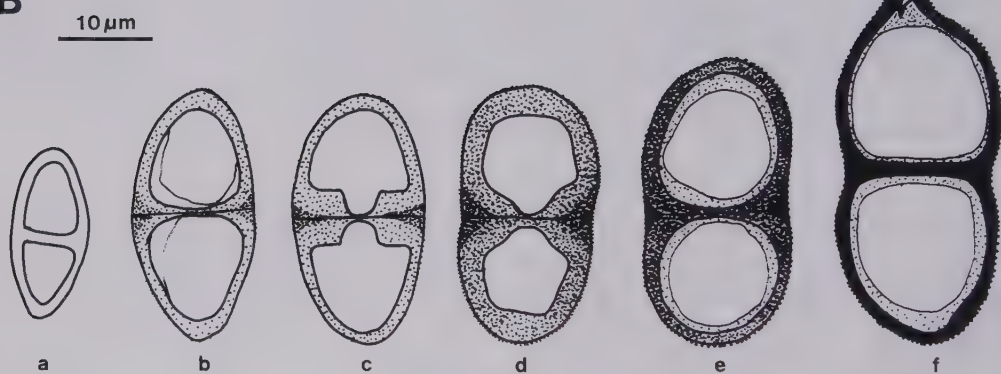
Usually the pycnidia are scattered over the thallus and immersed, except for the more or less protruding mouth, but sometimes they are crowded and partly free. In general they are flask shaped (Fig. 13) and about 100–200 µm wide, but the crowded ones usually consist of united pycnidia of a more indefinite shape and size.

The conidiophores seem to be of the same type in all examined species and correspond to

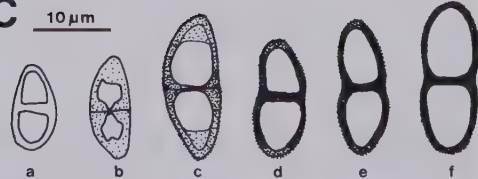
A



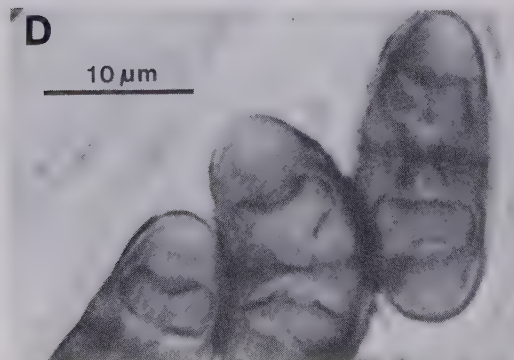
B



C



D



E



the "Physcia-Typus" in the terminology of Glück (1899). The conidia are produced terminally and laterally on short-celled and branched conidiophores (A. Henssen pers. comm.).

With respect to their size and shape the pycnoconidia are here separated into three distinct groups, filiform, subcylindric and ellipsoid. The filiform type (more than 10 μm long) was already recognized by Vainio (1890), who founded the group *Macrosperma* (now *Physciopsis*) on this type of pycnoconidia. The two other types have up to now not been separated, but it is evident from the examination of the Nordic species of *Physcia* s. lat. that the so-called short and straight pycnoconidia include two distinct types differing both in size and shape. The smaller conidia are ellipsoid and measure about $2\text{--}4 \times 1 \mu\text{m}$ (Fig. 14A, B). They are characteristic of the new genus *Phaeophyscia*. The larger conidia are subcylindrical and about $4\text{--}7 \times 1\text{--}1.5 \mu\text{m}$ (Fig. 14C, D) and are present in the other two genera treated, *Physcia* s. str. and *Physconia*. Between these two types there seems to be no intermediates, which is further confirmed by the examination of other *Physcia* species (s. lat.) from other parts of the world.

Apart from the Physciaceae, pycnoconidia have been used as an important generic character in, for example, the Parmeliaceae, and in his study of the lichen genus *Lecanora* (Lecanoraceae), Eigler (1969:43) considered the shape of the pycnoconidia to be of great taxonomic importance. Seven (or nine) distinct groups are summarized which seem to be closely connected with the proposed systematical scheme at the end of the book. However, as a conclusion Eigler proposed a more detailed study of the varia-

tion in size and shape of the different types of pycnoconidia.

Some further observations supporting the taxonomic importance of the pycnoconidia at generic level are quoted below.

In the family Teloschistaceae, which is closely related to Physciaceae, it may be difficult to understand the difference between *Xanthoria* and *Caloplaca* sect. *Gasparrinia*, and the results from the examination of the pycnoconidia do not support the present accepted generic division. Of the Scandinavian species of *Xanthoria* and *Caloplaca* sect. *Gasparrinia* all species, except for *X. fallax*, *C. heppiana* and *C. thallincola*, have small ellipsoid conidia ($2\text{--}4 \times 1 \mu\text{m}$, cf. Fig. 14A, B). The three aforementioned species, together with the Extra-Scandinavian species *C. aurantia*, have subcylindrical conidia ($4\text{--}6 \times 1 \mu\text{m}$, cf. Fig. 14C, D). This distinction, which appears to be correlated with differences in ascospore shape (Nordin 1972:4) indicates that the generic delimitation is in need of further investigation.

In the family Parmeliaceae the genus *Parmeliopsis* is separated from the other genera mainly because of its filiform pycnoconidia. The genus *Hypogymnia* is also known to have conidia differing from the other closely related genera. Examination of Scandinavian species confirms this difference, but with one exception, *Parmelia alpicola* Th. Fr. This species has been placed both within *Parmelia* (Poelt 1969 and Dahl & Krog 1973) and *Hypogymnia* (Hillman 1936 and Havås 1936) and with respect to the shape of the conidia its treatment within *Hypogymnia* seems to be the correct one.

With present knowledge and advanced technical equipment it would be of great interest to

Fig. 11. A. Ontogeny of spores of Physcia-type. *Physcia caesia*. B. Ontogeny of spores of Physconia-type. *Physconia pulverulenta*. C. Ontogeny of spores of *Physcia magnussonii*. D. Micrograph of spores of Physcia-type. *Physcia stellaris*. E. Micrograph of spores of *Physcia magnussonii*.

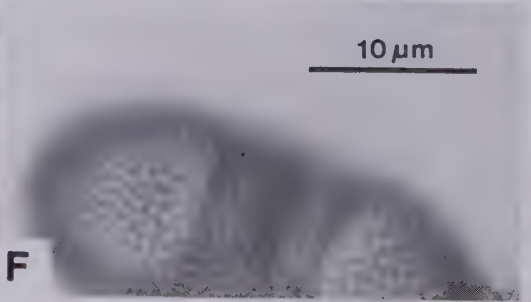
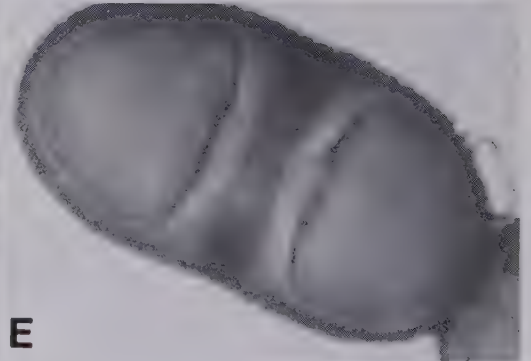
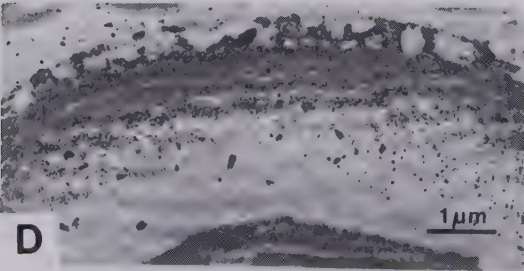
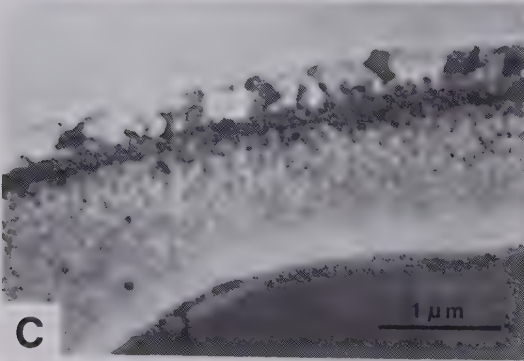
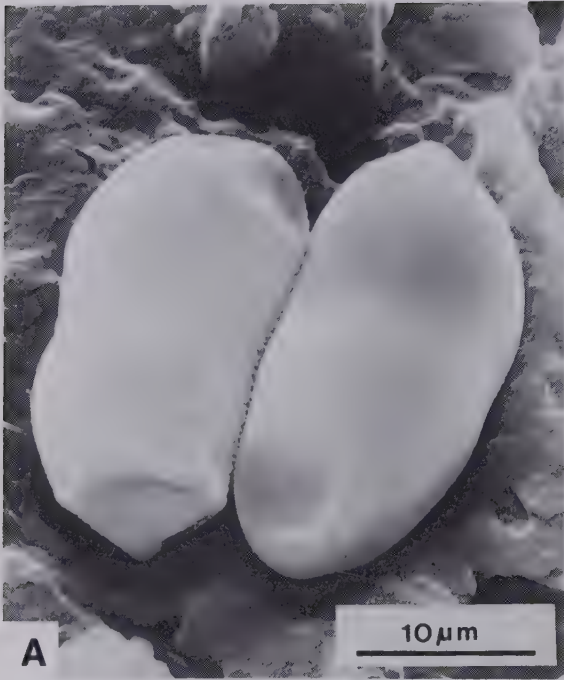




Fig. 13. Longitudinal section of pycnidium. *Physconia pulverulenta*, Sweden, Jmt, Moberg 1391b (UPS, herb. Mob.).

renew the systematic examination of the pycnidia performed by Glück (1899). Until then, it is hardly possible to fully appreciate the significance of the ontogeny, shape and size of the pycnoconidia. However, within *Physcia* s. lat. it seems to be a reliable criterion at generic level.

Fig. 12. A–B (same magn.). SEM micrographs of spores showing surface structure. A. *Physconia*-type, *Physconia pulverulenta*. B. *Physcia*-type, *Physcia aipolia*.

C–D. TEM micrographs of spore-walls. C. *Physconia*-type, *Physconia pulverulenta*. D. *Physcia*-type, *Physcia dubia*.

E–F (same magn.). Micrographs of spore of *Physconia*-type. The same spore in different focusing, *Physconia pulverulenta*.

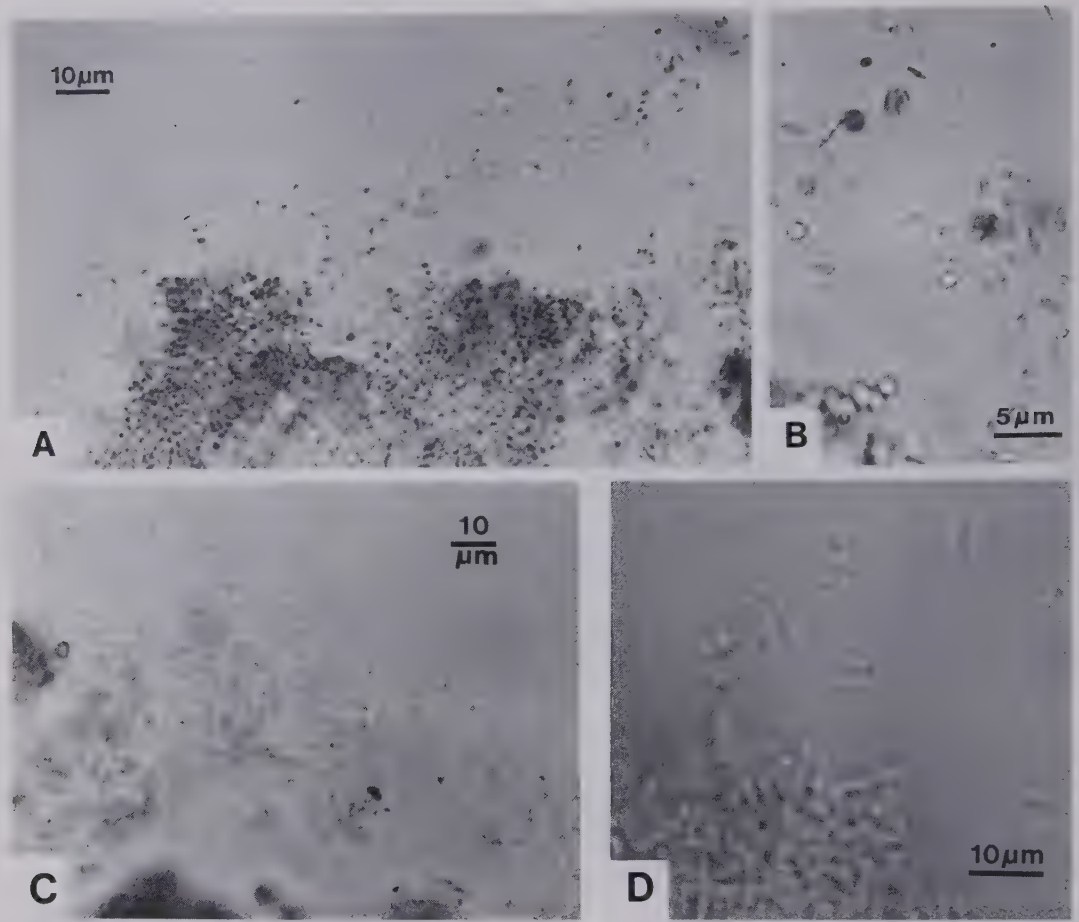


Fig. 14. A–B. Micrographs of ellipsoid pycnoconidia. A. *Phaeophyscia ciliata*, Norway, Opl, Moberg 1313a (UPS). B. *Phaeophyscia kairamoi*, Sweden, Hrj, Moberg 999 (UPS, herb. Mob.).

C–D. Micrographs of subcylindrical pycnoconidia. C. *Physcia aipolia*, Sweden, Upl, Moberg 2308 (UPS). D. *Physcia caesia*, Sweden, Sk, Santesson 24301 (UPS, herb. Mob.).

CHEMISTRY

Colour tests with KOH have been widely used as a key character within *Physcia* s. lat. and it has been used mostly for the identification of the presence of atranorin. The presence or absence of some other lichen substances has also been tested by KOH (see below). Atranorin, which in this study has been found only in the genus *Physcia* s. str., gives a typical yellow colour-reaction (K+) with the KOH-test, and the absence of colouration may consequently indicate lack of atranorin. The localization of atranorin is different in different species and this is also of importance as a key character. All species of *Physcia* s. str. have atranorin in the upper cortex but only in *Ph. aipolia*, *Ph. caesia*, and *Ph. phaea* it is found in the medulla. In this connection it is important to note that for the medulla test it is necessary to remove the whole algal layer carefully. This is of special importance for thin specimens and several errors, found both in literature and in herbarium material, originate from wrongly made tests (cf. *Physcia dubia*).

Colour tests with KOH are also carried out in the genus *Physconia*. The medulla of *Ph. enteroxantha* usually has a yellowish tinge indicating the presence of an unknown substance which becomes more intensely yellow with KOH. No other species of the genus in Fennoscandia seems to have the same substance or any other substances which react with KOH.

For the identification of lichen substances Thin Layer Chromatography and Mass Spectroscopy (TLC and MS, see Material and Methods) have been used. Three substances have been identified, atranorin, zeorin and skyrin (earlier named rhodophyscin, cf. Huneck 1974). Atranorin is present in all species of *Physcia* s. str. (see above); zeorin has been found in *Physcia aipolia*, *Ph. caesia*, *Ph. phaea*, and *Phaeophyscia endococcina*; and skyrin has been recorded in *Phaeophyscia endococcina*, *Ph. endophoenicea* and *Ph. orbicularis*. It is notable that the presence of zeorin in the genus *Physcia* s. str. is connected with the presence of atranorin in the medulla.

As far as this examination is concerned the genera *Phaeophyscia*, *Physciopsis* and *Physconia* are separated chemically from the genus *Physcia* by the absence of atranorin in detectable amounts in TLC. The study by Kashiwadani (1975) seems to oppose this, but in no case has the examination of Nordic material revealed the presence of atranorin in these three genera.

The chemistry of the genus *Physconia* is not yet fully understood. The yellow pigment in *Ph. enteroxantha* has not been identified, and in *Ph. grisea* four unidentified substances seem to be present. However, the different chemistry of *Ph. grisea* supports the treatment of this species in a section of its own.

DISTRIBUTION AND HABITAT

The term Fennoscandia in the present paper refers to the countries Sweden, Norway, Finland and Denmark. This is somewhat different from the geological delimitation (the origin) but there is no other adequate designation of the area concerned. According to Map 2 the countries are subdivided into 74 provinces and in Table 2 their common names and abbreviations are presented.

The distributions of the various taxa have as a rule been summarized in maps, which have been based on the Universal Transverse Mercator (UTM) grid-system, with 25×25 km squares (Map 1). One or more localities within these squares are marked with a dot in the middle of the square. Along the compensation zones for every sixth meridian irregular squares occur. If such a square is smaller than 15 km, the adjacent irregular square is included (cf. Map 2 and 3 in Uppland, Sweden). Irregular square smaller than 7.5 km has been included in the adjacent regular square (cf. Map 2 and 3 in Tavastia australis, Finland). This mapping scheme has been adopted to make it possible to extend the mapping to the rest of Europe in accordance with the vascular plant mapping scheme, Atlas Florae Europaeae.

Distribution groups

Even though the present knowledge of the distribution of the treated taxa is somewhat incomplete, it is sufficient for some general discussions concerning distribution groups. However, the knowledge is too scanty to use the vegetation zone system discussed by Ahti & al. (1968) so, instead, the grouping has mainly been based on the geographical distribution in Fennoscandia. In most cases the connections to the Central European distributions have had to be neglected because of insufficient knowledge.

The following groups may be distinguished:

1. Species occurring in the whole area

Physcia aipolia, *Ph. caesia* and *Ph. dubia*.

Physcia aipolia is frequent in the south but becomes more scattered northwards. In the northern-alpine range var. *aipolia* is largely replaced by var. *alnophila*, although the two varieties may grow together (Fig. 28). *Ph. caesia* and *Ph. dubia* have about the same frequency over the whole area, both latitudinally and altitudinally, but have evidently been collected more rarely in the north.

2. More or less common species with a southern trend

Phaeophyscia orbicularis, *Physcia adscendens* and *Ph. tenella* (Map 9, 11, 12 and 13 resp.)

These three species distinctly decrease in frequency towards the north. The reason for this may be a preference for a more southerly climate, but may also be due to the northward decline in the occurrence of suitable substrata.

3. More or less common species with a northern trend

Phaeophyscia endococcina and *Physcia stellaris* (Map 5 and 19 resp.).

From field experiences it appears that *Ph. endococcina* has a wider distribution in the northern range, although seemingly not frequent in any part of Fennoscandia. *Ph. stellaris*, on the other hand, is frequent in the north but seldomly collected, whereas it is scarcer in the south but frequently collected.

4. Southern species

Phaeophyscia endophoenicea (Map 6), *Ph. nigricans* (Map 8), *Physcia semipinnata* (Map 14), *Physciopsis adglutinata* (Map 21), *Physconia enteroxantha* (Map 23), *Ph. grisea* (Map 27), *Ph. perisidiosa* (Map 25) and *Ph. pulverulenta* (Map 26).

Within this group there is a marked difference in the range of the various species. The most

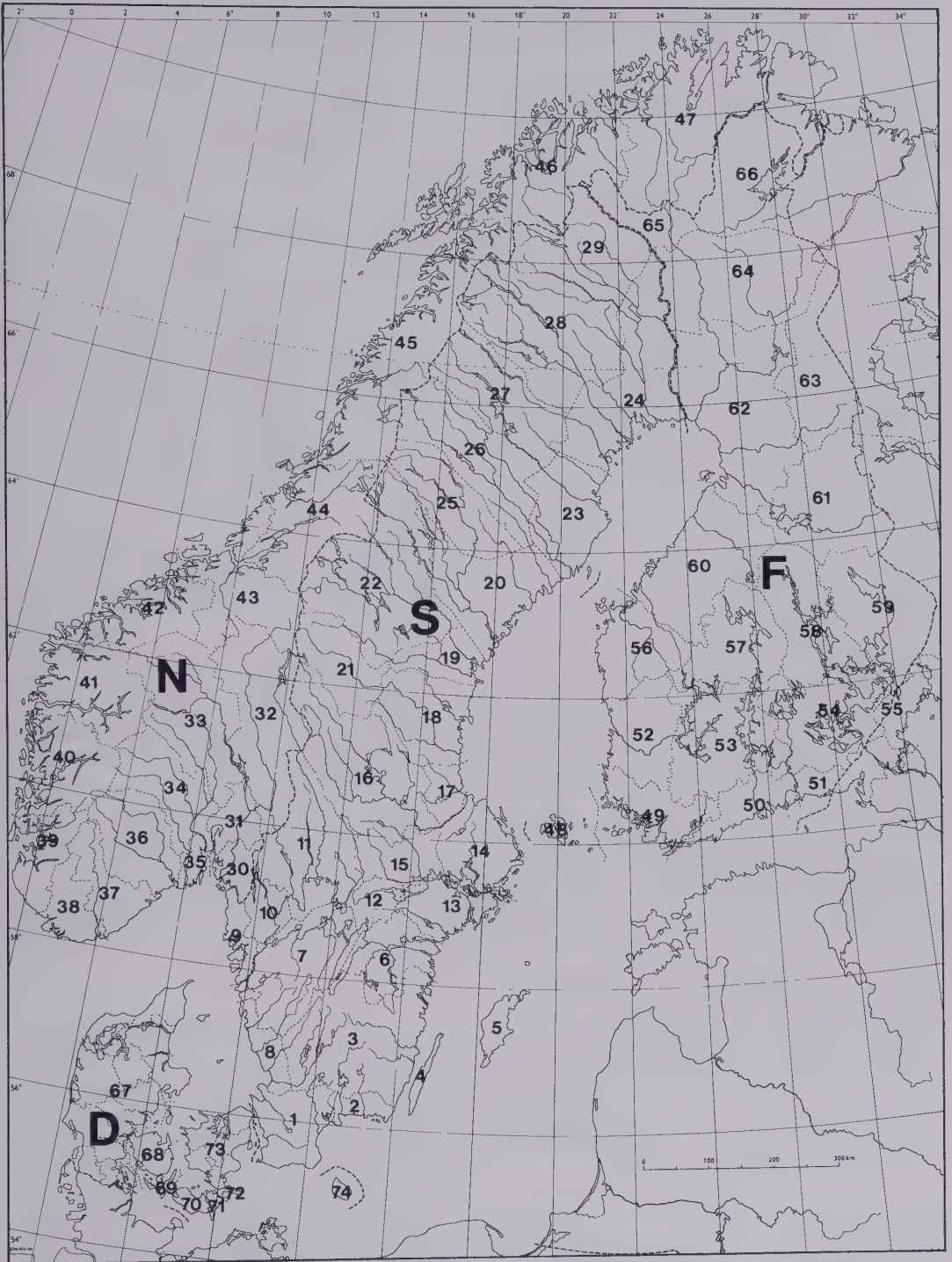


Map 1. The universal Transverse Mercator (UTM) grid-system with 25×25 km squares. Produced by National Land survey, Gävle (Sweden).

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Table 2. Subdivision of Sweden, Norway, Finland and Denmark into provinces with common abbreviations.

Province	Figure on Map 1	Common abbreviations			
Sweden	1-29	S	Nord-Trøndelag	44	NTrd
Bohuslän	9	Bh	Oppland	33	Opl
Blekinge	2	Bl	Rogaland	39	Rog
Dalarna	16	Dlr	Sogn of Fjordane	41	SoFj
Dalsland	10	Dls	Sör-Trøndelag	43	STrd
Gästrikland	17	Gstr	Telemark	36	Tel
Gotland	5	Gtl	Troms	46	Trs
Halland	8	Hl	Vest-Agder	38	VAgd
Hälsingland	18	Hls	Vestfold	35	Vestf
Härjedalen	21	Hrj	Östfold	30	Östf
Jämtland	22	Jmt	Finland	48-66	F
Lule Lappmark	28	LL	Alandia	48	Al
Lycksele Lappmark	26	LyL	Karelia australis	51	Ka, EK
Medelpad	19	Mpd	Karelia borealis	59	Kb, PK
Norrbottn	24	Nb	Karelia ladogensis	55	Kl, LK
Närke	12	Nrk	Lapponia enontekiensis	65	Le, EL
Pite Lappmark	27	PL	Lapponia inarensis	66	Li, IL
Skåne	1	Sk	Lapponia kemensis	64	Lk, KL
Småland	3	Sm	Nylandia	50	Nyl, U
Södermanland	13	Srm	Ostrobottnia australis	56	Oa, EP
Torne Lappmark	29	TL	Ostrobottnia borealis	62	Ob, PP
Uppland	14	Upl	Ostrobottnia kajanensis	61	Ok, K
Västerbotten	23	Vb	Ostrobottnia media	60	Om, KP
Västergötland	7	Vg	Regio aboënsis	49	Ab, VS
Värmland	11	Vrm	Regio kuusamoënsis	63	Ks
Västmanland	15	Vsm	Savonia australis	54	Sa, ES
Ångermanland	20	Ång	Savonia borealis	58	Sb, PS
Åsele Lappmark	25	ÅsL	Satakunta	52	St
Östergötland	6	Ög	Tavastia australis	53	Ta, EH
Öland	4	Öl	Tavastia borealis	57	Tb, PH
Norway	30-47	N	Denmark	67-74	D
Akershus	31	Akh	Bornholm	74	Brnh
Aust-Agder	37	Au Agd	Falster	71	Flst
Buskerud	34	Busk	Fyn	68	
Finnmark	47	Fnm	Jylland (incl. Laesö, Ånholt and Samsö)	67	Jl
Hedmark	32	Hdm	Langeland	69	Lang
Hordaland	40	Hrd	Lolland	70	Loll
Møre og Romsdal	42	MöRo	Mön	72	
Nordland	45	Nrd	Sjaelland	73	Sj



Map. 2. Subdivision of Sweden, Norway, Finland and Denmark into provinces, see Table 2

southerly distribution patterns are exhibited by *Ph. semipinnata*, *Ph. adglutinata* and *Ph. grisea*. The inclusion of *Ph. adglutinata* is not solely based on the very few Fennoscandian localities but also on records from the rest of Europe. *Ph. semipinnata* seems to have a preference for coastal sites but as it is found only in the southern part of Fennoscandia it is included in this group.

Ph. endophoenicea was formerly recognized as suboceanic (Moberg 1975), but from the new records in Sweden (Värmland and Uppland) it is now regarded as a southern species.

The other species listed have a distinctly southern range with only scattered localities in the northern part of Fennoscandia. Such northern localities are often situated on southerly exposed, rocky hillsides which have additional southern floristic elements.

5. Northern—alpine species

Phaeophyscia constipata, *Ph. kairamoi*, and *Physconia muscigena* (Map 4, 7 and 24 resp.).

In this group, especially, information is insufficient to allow a comparison between the Fennoscandian and Central European distributions. Also, the connection towards the east would probably be of interest, but until the investigation has been extended only the distribution in Fennoscandia can be considered.

The main distribution of *Ph. constipata* is in the northern-alpine areas, although there are some records outside this range, that may indicate a preference for sites with a continental climate.

Most of the records for *Ph. muscigena* are from the northern part of the Scandinavian Mountains and the species reaches a very high altitude (c. 1600 m). The lowland records from, e.g. Öland and Gotland, seem to oppose its treatment in this group, but some vascular plants (e.g. *Pinguicula alpina*) that behave in the same way are still regarded as alpine.

6. Eastern species

Phaeophyscia ciliata and *Physconia detersa* (Map 3 and 22 resp.).

These two species are neither northern nor southern but seem to increase in frequency from West to East. It is necessary to know more about their distribution in USSR, although the older records from the provinces just east of Finland seem not to oppose the suggested characterization.

7. Species with a more or less indefinite distribution pattern

Physcia dimidiata var. *ornata*, *Ph. magnussonii*, and *Ph. phaea* (Map 20, 18 and 17 resp.).

Physcia dimidiata var. *ornata* has earlier been considered to have affinity to continental sites (Moberg 1971) and the new records (Flatberg & al. 1975) do not oppose that. For *Ph. magnussonii* and *Ph. phaea* see the maps.

Habitat

According to their preference to substrate the species can be grouped as follows:

1. Corticolous species

Phaeophyscia ciliata, *Ph. endophoenicea*, *Physcia adscendens*, *Ph. aipolia*, *Ph. semipinnata*, *Ph. stellaris*, *Physciopsis adglutinata* and *Physconia grisea*.

This group includes species which have rarely been found on substrates other than the trunks of various deciduous trees. The inclusion of *Ph. adscendens* could perhaps be questioned, but the exceptions are too few to treat the species in another group.

2. Corticolous species occasionally found on other substrates

Phaeophyscia nigricans, *Ph. orbicularis*, *Physcia tenella* var. *tenella*, *Physconia enteroxantha*, *Ph. perisidiosa* and *Ph. pulverulenta*.

Because of its occurrence on various substrates *Ph. nigricans* has earlier been separated into two or more taxa. As the preferences of substrate is not connected with any other difference these taxa cannot be maintained (see below).

Ph. tenella is subdivided into two varieties (see group 3), and the variety treated in this group is sometimes found growing on rock, especially beneath trees.

The other listed species are mainly corticolous in the southern parts of their ranges, but in their northernmost localities they are usually saxicolous.

3. Saxicolous species

Phaeophyscia endococcina, *Ph. kairamoi*, *Ph. sciastra*, *Physcia dimidiata*, *Ph. magnussonii*, *Ph. phaea* and *Ph. tenella* var. *marina*.

The listed species of *Phaeophyscia* are all of rare occurrence on other substrates; *Ph. endococcina* and *Ph. sciastra* are known on both trunks and lignum and *Ph. kairamoi* has been found a few times on trunks.

The species of *Physcia* are all exclusively found on rocks.

4. Saxicolous species occasionally found on other substrates.

Physcia caesia, *Ph. dubia* and *Physconia deterosa*.

Ph. caesia and *Ph. dubia* have been found on most kinds of substrates but not directly on the ground. The most common substrates besides rocks are lignum and trunks of deciduous trees.

Apart from rocks *Ph. deterosa* seems to prefer trunks of deciduous trees.

5. Terricolous species

Phaeophyscia constipata and *Physconia muscigena*.

These two species may grow either directly on the ground or among bryophytes on the ground. Reports in literature of other substrates for *Ph. muscigena* are in all examined cases, based on wrongly determined material.

All corticolous species (group 1 and 2) prefer more or less basic and nutrient rich substrates and are very rarely found growing on, for instance, conifers. The following species are characterized as so called rich-bark species: *Phaeophyscia endophoenicea*, *Ph. nigricans*, *Ph. orbicularis*, *Physcia semipinnata*, *Physconia enteroxantha*, *Ph. perisidiosa*, *Ph. pulverulenta* and *Ph. grisea*. As deciduous trees with "rich-bark" are more or less restricted to the southern part of Fennoscandia, the corticolous species which have a more northerly distribution are usually able to grow on more acid bark. Such species are: *Phaeophyscia ciliata*, *Physcia adscendens*, *Ph. tenella*, *Ph. aipolia* and *Ph. stellaris*.

No saxicolous species, perhaps with the exception of the rare species *Phaeophyscia kairamoi* and *Physcia dimidiata* var. *ornata*, seem to have the same demand on basic substratum, and species such as *Physcia caesia* and *Ph. dubia* may grow equally well on both acid and basic bedrock. These two species are also very often found growing on boulders manured by birds. On the whole, the saxicolous species are usually found growing on acid bedrock.

The terricolous species are favoured by high lime content in the bedrock and in the scattered southern localities this affinity is very pronounced.

PRIMARY AND SECONDARY SPECIES

Both from the morphological (e.g. Poelt 1970) and chemical (Bowler and Rundel 1975) points of view, there seems to be indications that the evolution within lichens has run from exclusively sexual species to species with vegetative diaspores (e.g. soralia, isidia). Consequently efforts have been made to pair such species, and within *Physcia* s. lat. the two species *Ph. ciliata* and *Ph. orbicularis* have been used as a case in point of a so called 'species pair.' However, as far as this examination is concerned there seems to be more than two species involved in several cases, and the designation of primary and secondary species (Poelt 1972) for sexual and asexual morphologies respectively is preferred.

In the genus *Phaeophyscia*, *Ph. ciliata*, *Ph. constipata* and *Ph. endococcina* have been regarded as primary species and *Ph. endophoenicea*, *Ph. kairamoi*, *Ph. nigricans*, *Ph. orbicularis* and *Ph. sciastra* as secondary species. Morphologically, *Ph. endophoenicea* and *Ph. orbicularis* are closely related to *Ph. ciliata*, but chemically the presence of skyrin links them to *Ph. endococcina*. On the other hand, *Ph. endococcina* contains zeorin which separates it from these and all other species of *Phaeophyscia*. It could be assumed that the presence of skyrin in *Ph. orbicularis* and *Ph. endophoenicea* indicates a more distant relationship to *Ph. ciliata*, and a closer relationship to a common ancestral primary species which contained skyrin. *Ph. ciliata* could then be considered the skyrin-deficient mutant and *Ph. endophoenicea* and *Ph. orbicularis* the secondary species of this hypothetical, ancestral species. However, if the presence or absence of skyrin is ignored, *Ph. ciliata* could be considered the primary species, with *Ph. endophoenicea* and *Ph. orbicularis* as its secondary species.

Morphologically, *Ph. endococcina* is very closely related to *Ph. sciastra*, although chemically they are quite different because *Ph. sciastra* lacks skyrin and zeorin. Just as in the case of

Ph. ciliata/*Ph. endophoenicea*—*Ph. orbicularis*, there are at least two evolutionary possibilities.

Ph. constipata is, except for the difference in size, morphologically very closely connected with *Ph. nigricans*. As they do not differ in chemistry they can be confidently regarded as corresponding primary/secondary species.

Ph. kairamoi apparently has no primary counterpart in Fennoscandia, and is probably not closely related to *Ph. sciastra*.

In the genus *Physcia* the species are grouped into various sections according to morphological and chemical characters. Section *Physcia* is characterized by the presence of cilia and its members are easily grouped into primary and secondary species. *Ph. semipinnata* corresponds to the criteria of a primary species in being sexual only and rather rare. *Ph. adscendens* and *Ph. tenella* have probably evolved from *Ph. semipinnata* or a similar ancestor, perhaps in different lines by gaining different types of soralia.

In the section *Stellares*, *Ph. stellaris* is regarded as a primary species, with *Ph. dubia* as its corresponding secondary species because of the very close affinities between the two.

The secondary species *Ph. dimidiata* has no related primary species in Fennoscandia.

In the section *Caesia* there are two species, *Ph. aipolia* and *Ph. phaea*, which evidently are primary species, although there is only one, *Ph. caesia*, which can be regarded as secondary. Chemically, they are all identical, but morphologically, *Ph. aipolia* and *Ph. caesia* are more closely connected. The connection between the two primary species may be an ancestral species, and with *Ph. phaea* evidently having no secondary counterpart in Fennoscandia.

The genus *Physciopsis* is represented by only one species in Fennoscandia. It is a secondary species and in North America there is a sexual species, *Ph. syncolla*, which morphologically closely coincides with *Ph. adglutinata*. These species could probably be paired.

In the genus *Physconia* two sections have been recognized according to morphology and chemistry. Section *Griseae* contains only one species, *Ph. grisea*, which is regarded as a secondary species, and in Fennoscandia there is no species which can be considered as its primary counterpart. Section *Physconia* comprises of two species which correspond to primary species, *Ph. muscigena* and *Ph. pulverulenta*, and three secondary species, *Ph. detera*, *Ph. enteroxantha* and *Ph. perisidiosa*. According to morphology and chemistry *Ph. pulverulenta* may be taken to be the primary counterpart of the two secondary species *Ph. detera* and *Ph. perisidiosa*. However, in southern Europe there is a species, *Ph. venusta*, which seems to be more closely related to *Ph. perisidiosa*, and is more likely to be the latter's primary partner.

Ph. muscigena and *Ph. enteroxantha* are closely related morphologically but distinctly different chemically. They may have evolved from a common ancestor, but as in similar treated cases, e.g. *Phaeophyscia ciliata*, they are regarded as primary/secondary species with a question-mark.

Proposed scheme for related species

Primary species	Secondary species
<i>Phaeophyscia ciliata</i>	<i>Phaeophyscia endophoenicea</i> , <i>Ph. orbicularis</i> ?
<i>Phaeophyscia constipata</i>	<i>Phaeophyscia nigricans</i> ?
<i>Phaeophyscia endococcina</i>	<i>Phaeophyscia sciastra</i> ?
no Fennoscandian species	<i>Phaeophyscia kairamoi</i>
<i>Physcia semipinnata</i>	<i>Physcia adscendens</i> , <i>Ph. tenella</i>
<i>Physcia stellaris</i>	<i>Physcia dubia</i> <i>Ph. dimidiata</i>
no Fennoscandian species	
<i>Physcia aipolia</i>	<i>Physcia caesia</i>
<i>Physcia phaca</i>	no Fennoscandian species
<i>Physcia magnussonii</i>	no Fennoscandian species
<i>Physciopsis syncolla</i> (not Fennoscandian)	<i>Physciopsis adglutinata</i>
no Fennoscandian species	<i>Physconia grisea</i>
<i>Physconia muscigena</i>	<i>Physconia enteroxantha</i> ?
<i>Physconia pulverulenta</i>	<i>Physconia detera</i>
<i>Physconia venusta</i> (not Fennoscandian)	<i>Physconia perisidiosa</i>

TAXONOMY

General account on generic level

The genus *Physcia* s. lat. was first subdivided by Vainio (1890, summarized below). His sections *Euphyscia* and *Dirinaria* were characterized by a colourless or brownish-black hypothecium respectively. Without any infrageneric rank given, he subdivided *Euphyscia* into *Albida* and *Sordulenta*, separated by positive (yellow) or negative reaction with KOH respectively. The group *Sordulenta* was finally divided into *Brachysperma* with short almost oblong pycnoconidia, and *Macrosperma* with filiform pycnoconidia.

In the monographic treatment of the Norwegian Physciaceae, Lynge (1916) did not use any subdivision of the genus and Du Rietz (1925b) was the first to adopt the groups proposed by Vainio by applying them to some Scandinavian species. Du Rietz also proposed a separation of *Brachysperma* into the two series *Pulverulentae* and *Obscurae*, differing in size and pruinosity (see below).

In a later work on *Physcia*, Lynge (1935) gave the two groups *Macrosperma* and *Brachysperma* the rank of subgenus and the latter was split into several sections. Subgenus *Macrosperma* was given the same delimitation as by Vainio, but subgenus *Brachysperma* was used in a quite different way, evidently corresponding to the rest of *Euphyscia* in the sense of Vainio. The infrageneric divisions of the genus proposed by Vainio, Du Rietz and Lynge are summarized below.

VAINIO (1890)

Sect. I *Euphyscia* Th. Fr.

a. *Albida* Vain.

b. *Sordulenta* Vain.

1. *Brachysperma* Vain.

2. *Macrosperma* Vain.

Sect. II *Dirinaria* (Tuck.) Vain.

DU RIETZ (1925)

Sect. (?) *Albida* Vain.

Sect. (?) *Sordulenta* Vain.

A. Subsect. *Brachysperma* Vain.

I. Ser. *Pulverulentae* Du Rietz

II. Ser. *Obscurae* Du Rietz

B. Subsect. *Macrosperma* Vain.

LYNGE (1935)

Subgen. *Macrosperma* (Vain.) Lynge

Subgen. (?) *Brachysperma* (Vain.) Lynge

Sect. *Tenella* Lynge

Sect. *Stellaris* Lynge

Sect. *Astroidea* Lynge

Sect. *Caesia* Lynge

Sect. *Tribacia* Lynge

Sect. *Obscura* (Du Rietz) Lynge

Sect. *Pulverulenta* (Du Rietz) Lynge

The subdivision proposed by Lynge was later adopted in the main by Nádvozník (1947), Maas Geesteranus (1952), Thomson (1963) and Frey (1963).

In 1950 Choisy proposed the generic level for subgenus *Macrosperma* (*Physciopsis*), but this was rarely accepted until the treatment of the family Physciaceae by Poelt (1965). In the same paper Poelt also proposed the genus *Physconia*, mainly on the basis of a divergent spore type. *Physconia* does not directly correspond to the section *Pulverulenta* of Lynge but has to be regarded as a part of it. In a later paper Poelt (1966) divided the genus into three series, *Griseae*, *Pulverulentae* and *Venustae*, differing in cortical structure and type of rhizinae. This subdivision was not accepted by Kashiwadani (1975) who included series *Venustae* in series *Pulverulentae* and excluded series *Griseae* from *Physconia*, treating it as a section of *Physcia* because of the structure of the upper cortex.

In the present work the type of spores and pycnoconidia is considered to be of greater importance at generic level than other vegetative

Table 3. Comparison of suggested subdivisions of *Physcia* s. lat.

Vainio (1890)	Present work	Lynge (1935)
I. <i>Euphyscia</i>		<i>Euphyscia</i>
a. <i>Albida</i>	<i>Physcia</i> s. str.	} <i>Brachysperma</i> <i>Obscura</i>
b. <i>Sordulenta</i>		
1. <i>Brachysperma</i>	<i>Phaeophyscia</i> <i>Physconia</i> (?)	
2. <i>Macrosperma</i>	<i>Physciopsis</i>	<i>Macrosperma</i>

characters (e.g. the type of cortical structure). The chemistry has also been given fundamental importance in the separation of the different groups. Consequently the two genera *Physciopsis* and *Physconia* have been accepted following Poelt (1965 and 1966) and the new genus

Phaeophyscia has been proposed (see below). Compared to the earlier subdivisions of *Physcia* s. lat. (before Poelt 1965) the present treatment very close corresponds to the one first proposed by Vainio (1890) cf. Table 3.

Review of the species treated

Phaeophyscia Moberg

- Ph. ciliata* (Hoffm.) Moberg
- Ph. constipata* (Norrl. et Nyl.) Moberg
- Ph. endococcina* (Kbr) Moberg
- Ph. endophoenicea* (Harm.) Moberg
- Ph. kairamoi* (Vain.) Moberg
- Ph. nigricans* (Flk.) Moberg
- Ph. orbicularis* (Neck.) Moberg
- Ph. sciastra* (Ach.) Moberg

Physcia (Schreb.) Michaux

Sect. *Physcia*

- Ph. adscendens* (Fr.) Oliv.
- Ph. semipinnata* (Gmelin) Moberg
- Ph. tenella* (Scop.) DC
- var. *tenella*
- var. *marina* (E.Nyl.) Lynge

Sect. *Caesia* Lynge emend. Moberg

- Ph. aipolia* (Humb.) Fűrnröhr
- var. *aipolia*
- var. *alnophila* (Vain.) Lynge
- Ph. caesia* (Hoffm.) Fűrnröhr
- Ph. phaea* (Tuck.) Thoms.

Sect. *Fusisporae* Moberg

- Ph. magnussonii* Frey

Sect. *Stellares* Lynge emend Moberg

- Ph. dimidiata* (Arn.) Nyl.
- var. *ornata* (Nadv.) Moberg

Ph. dubia (Hoffm.) Lett.

Ph. stellaris (L.) Nyl.

Physciopsis Choisy

Ph. adglutinata (Flk.) Choisy

Physconia Poelt

Sect. *Physconia*

- Ph. detera* (Nyl.) Poelt
- Ph. enteroxantha* (Nyl.) Poelt
- Ph. muscigena* (Ach.) Poelt
- Ph. perisidiosa* (Erichs.) Moberg
- Ph. pulverulenta* (Hoffm) Poelt

Sect. *Griseae* (Poelt) Moberg

Ph. grisea (Lam.) Poelt

Key to the genera

1. Spores of *Physconia* Type (Fig. 12 E)
..... *Physconia* p. 80
- Spores of *Physcia* Type (Fig. 11 D) 2
2. Pycnoconidia more than 10 µm long, filiform, thallus closely appressed *Physciopsis* p. 77
- Pycnoconidia shorter, thallus not closely appressed 3
3. Pycnoconidia more than 4 µm long, sub-cylindric (Fig. 14 C, D), atranorin present K+yellow, thallus greyish *Physcia* p. 48
- Pycnoconidia smaller, ellipsoidal (Fig. 14 A, B), atranorin absent, thallus brownish
..... *Phaeophyscia* p. 29

Key to the taxa treated

1. Thallus greyish, colour little changed when moistened, K+ yellow (atranorin present) 2
- Thallus brownish, greenish or greyish, greenish when moistened, K- 13
2. Lobes with marginal cilia, usually ascending 3
- Lobes without cilia, $\pm$ closely appressed 6
3. Without soralia *Physcia semipinnata* p. 56
- With soralia 4
4. Soralia helmet-shaped. *Physcia adscendens* p. 50
- Soralia lip-shaped, not always recurved. 5
5. Corticolous, rarely on rocks *Physcia tenella* v. *tenella* p. 53
- On seashore rocks *Physcia tenella* v. *marina* p. 54
6. Medulla K+ yellow (atranorin present) 7
- Medulla K- 10
7. Without soralia 8
- With capitate, lip-shaped and/or crateriform soralia *Physcia caesia* p. 64
8. Lobes $\pm$ concave, usually broad (>1 mm), corticolous 9
- Lobes $\pm$ convex, usually narrow (<1 mm), saxicolous *Physcia phaea* p. 66
9. Apothecia to the lobe-tips, small and crowded, spores usually $<22 \mu\text{m}$ *Physcia aipolia* v. *alnophila* p. 62
- Apothecia not so, spores usually $>22 \mu\text{m}$ *Physcia aipolia* v. *aipolia* p. 61
10. Without soralia 11
- With soralia 12
11. Thallus densely pruinose, spores narrowly ellipsoid with distinct ornamentation, (Fig. 11 E), saxicolous. *Physcia magnussonii* p. 68
- Thallus not or weakly pruinose, spores without distinct ornamentation, corticolous *Physcia stellaris* p. 71
12. Densely pruinose, soralia marginal, soredia granular. *Physcia dimidiata* v. *ornata* p. 74
- Thallus not or weakly pruinose, soralia lip-shaped and/or laminal ... *Physcia dubia* p. 76
13. Thallus closely appressed, without or with few "rhizinae", pycnoconidia filiform, $>10 \mu\text{m}$ *Physciopsis adglutinata* p. 78
- Thallus $\pm$ loosely appressed, always with rhizinae, pycnoconidia subcylindric or ellipsoid (Fig. 14 A, B and 14 C, D) 14
14. Rhizinae squarrose (Fig. 2 F), thallus usually with a distinct pruina 15
- Rhizinae simple, rarely with pruina 19
15. With soralia 16
- Without soralia 18
16. Soralia marginal, not lip-shaped, lobes usually broader than 2 mm, not ascending, underside of lobe-tips brownish 17
- Soralia lip-shaped, lobes narrow (c. 1 mm), usually small and ascending, underside of lobe-tips whitish *Physconia perisidiosa* p. 90
17. Medulla and soralia yellowish, K+ distinctly yellow *Physconia enteroxantha* p. 85
- Medulla and soralia white, K- *Physconia detera* p. 81
18. Terricolous or among mosses on rocks, lobes $\pm$ ascending, apothecia $\pm$ common *Physconia muscigena* p. 88
- Corticolous, lobes not ascending, apothecia usually abundant ... *Physconia pulverulenta* p. 93
19. Broad-lobed (>2 mm), usually with pruina, lower side whitish, corticolous. *Physconia grisea* p. 96
- Lobes $\pm$ narrow, never with pruina, lower-side black, rarely whitish 20
20. Neither soralia nor isidia present 21
- Soralia and/or isidia present 23
21. Lobes narrow and ascending, underside whitish with few rhizinae, apothecia rare, terricolous. *Phaeophyscia constipata* p. 33
- Lobes not ascending, underside black, rhizinae abundant, apothecia common, corticolous or saxicolous. 22
22. Lobes concave or flat, >1 mm broad, apothecia with rhizinae, medulla white, corticolous *Phaeophyscia ciliata* p. 30
- Lobes usually convex, seldom broader than 1 mm, ap. with or without rhizinae, mostly with crenulate margins, medulla $\pm$ red-orange, epilithic or rarely corticolous *Phaeophyscia endococcinea* p. 35
23. With soralia, no isidia 24
- With isidia or sorediate isidia 25
24. Soralia marginal, lip-shaped, rarely laminal, medulla $\pm$ red-orange, apothecia very rare *Phaeophyscia endophoenicea* p. 38
- Soralia capitate, laminal and/or marginal, upper side sometimes yellowish, medulla white, ap. $\pm$ common *Phaeophyscia orbicularis* p. 44
25. Lobes ascending, very narrow (<0.5 mm), thallus very small (<1 cm), isidia becoming sorediate. *Phaeophyscia nigricans* p. 42
- Lobes not ascending, usually more than 1 mm broad, thallus bigger (>2 cm), isidia never sorediate 26
26. Isidia usually developing into ciliated lobules, lobes usually more than 1 mm broad with abundant rhizinae projecting beyond the margins. *Phaeophyscia kairamoi* p. 40
- Isidia not so, lobes usually less than 1 mm broad, rhizinae rarely projecting beyond the margins. *Phaeophyscia sciastra* p. 47

Phaeophyscia Moberg gen. nov.

Physcia sect. *Euphyscia* b. *Sordulenta* 1. *Brachysperma* Vain. 1890: 144. – *Physcia* sect. *Sordulenta* subsect. *Brachysperma* ser. *Obscurae* Du Rietz 1925 b: 79. – *Physcia* subgen. (?) *Brachysperma* sect. *Obscura* (Du Rietz) Lynge 1935: 125. – *Physcia* subgen. *Brachysperma* sect. *Obscura* (Du Rietz) Nádv. 1947: 77 (as “*Orbicularis*” p. 95). – *Physcia* subgen. *Physcia* sect. *Brachysperma* subsect. *Obscura* (Du Rietz) Maas G. 1952: 249. – *Physcia* subgen. *Euphyscia* sect. *Brachysperma* subsect. *Sordulenta* “group” *Obscura* (Du Rietz) Thoms. 1963: 102. – Type species (Poelt 1974: 75): *Physcia orbicularis* (Neck.) Poetsch.

Physcia “Gruppe” *Parvula* Räs. 1931: 135. – *Physcia* subgen. *Brachysperma* sect. *Parvula* (Räs.) Nádv. 1947: 107. – *Physcia* sect. *Brachysperma* subsect. *Obscura* ser. *Parvula* (Räs.) Frey 1963: 464. – Type species (Kashiwadani 1975: 35): *Physcia nigricans* (Flk.) Stiz.

Thallus foliaceus, $\pm$ adpressus, superne brunneus aut cinereus aut virescens, subtus niger vel fuscus, raro albidus. Stratum corticale superior e cellulis globosis vel paullo angularibus, stratum corticale inferior e cellulis globosis, vulgo fuscis. Apothecia subtus plerumque rhizinosa. Sporae uniseptatae, brunneae; pycnoconidia parvula, ellipsoidea; atranorinum deest.

A *Physcia* differt thallo colore brunneolo atranorino destituto, pycnoconidiis ellipsoideis.

Type species: *Phaeophyscia orbicularis* (Neck.) Moberg

Thallus foliose and lobate, sometimes fruticose, more or less loosely appressed to the substrate, greyish brown to brown, sometimes greenish, never with a white pruina. Underside black or dark brown, rarely whitish, with simple rhizinae mostly of the same colour as the underside. Upper cortex paraplectenchymatous (Fig. 2A); algae of Trebouxia type; medulla of loosely interwoven hyphae, white or in the lower part orange-red (skyrin); lower cortex usually brownish or blackish, paraplectenchymatous with isodiametric cells (Fig. 2A) or rarely prosoplectenchymatous.

Apothecia lecanorine, laminal, $\pm$ sessile, mostly with rhizinae on the underside (i.e. corona), disc brown to black. Hymenium hyaline, hypothecium colourless. Asci cylindrical, 8-spored, with brown, thick-walled, 1-septate spores (*Physcia*-type). Paraphyses $\pm$ branched, thick-end and brown towards the apices.

Pycnidia laminal, immersed except for their black tips; pycnoconidia ellipsoid (Fig. 14A, B) and small (less than 4 μ m long).

Atranorin absent as a major lichen substance.

As discussed earlier the small, ellipsoid type of pycnoconidia in *Phaeophyscia* is unique with-

Table 4. Comparison of the genera *Phaeophyscia*, *Physcia*, *Physciopsis* and *Physconia*.

	<i>Phaeophyscia</i>	<i>Physcia</i>	<i>Physconia</i>	<i>Physciopsis</i>
thallus	loosely appressed	loosely appressed	loosely appressed	closely appressed
Colour	brownish	greyish	brownish	brownish
spores	<i>Physcia</i> -type (Poelt 1965:23)	<i>Physcia</i> -type	<i>Physconia</i> -type (q.c.)	<i>Physcia</i> -type (?)
pycnoconidia	ellipsoid <4 μ m (Fig. 32)	cylindrical >4 μ m (Fig. 33)	cylindrical >4 μ m (Fig. 33)	filiform >10 μ m
cortical structure	see Table 1	see Table 1	see Table 1	
atranorin	absent	present	absent	absent

in the treated genera. However, this character is associated with other qualities and in Table 4 the genus is compared to related genera. It is seen that, apart from the pycnoconidia, *Phaeophyscia* differs from *Physcia* concerning chemistry and colour; from *Physciopsis* concerning habit; and from *Physconia* concerning spores.

In addition to these listed characters there are some other interesting features which have to be pointed out.

With very few exceptions (none of the species treated) the lower cortex of *Phaeophyscia* is composed of thick-walled isodiametric cells (Fig. 1C). This type of lower cortex is very rare in *Physcia* s. str. (none of the species treated) and has not been seen in *Physconia* or *Physciopsis*. Furthermore, in the *Physcia*-species with isodiametric cells the walls are much thinner.

The presence of rhizinae on the underside of the apothecia (corona, Fig. 9) seems to be pecu-

liar to this genus and has not been found in any species of the other genera.

Except for the absence of atranorin it is notable that skyrin has not been found in any European or North-American species which, according to the pycnoconidial feature, ought to be treated outside *Phaeophyscia*.

***Phaeophyscia ciliata* (Hoffm.) Moberg comb. nov.**

Fig. 15, Map 3

Lichen ciliatus Hoffm. 1784: 69. – *Physcia obscura* f. *ciliata* (Hoffm.) Lynge 1916: 71. – *Physcia ciliata* (Hoffm.) Du Rietz 1921: 168. – Neotype (sel. here): Sweden, Södermanland, St. Malm, Brännkärr, (1909 or 1912) Malme. Malme, Lich. Suec. exs. n. 309 (UPS). Isoneotypes H, LD, S.

Physcia concrustans Nyl. 1875: 359. – Lectotype (sel. here): Finland, Helsinki, 1873 Lang (Vainio) (H. herb. Nyl. n. 31980). – Isolectotypes: TUR (herb. Vain. n. 8428, 8429).

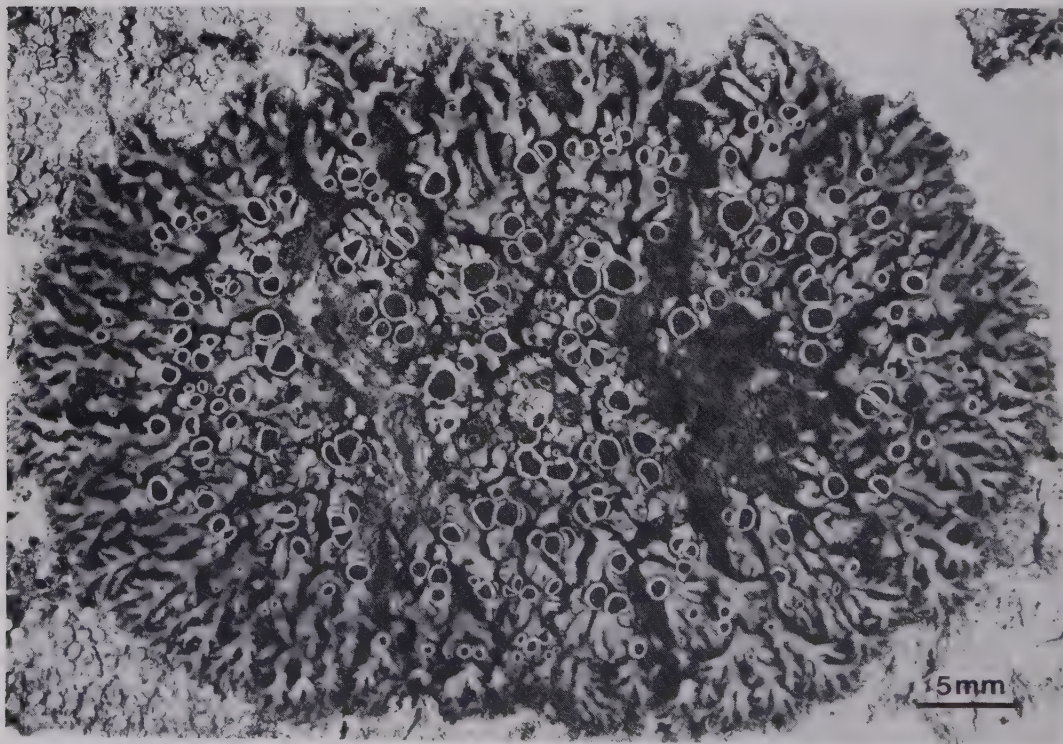
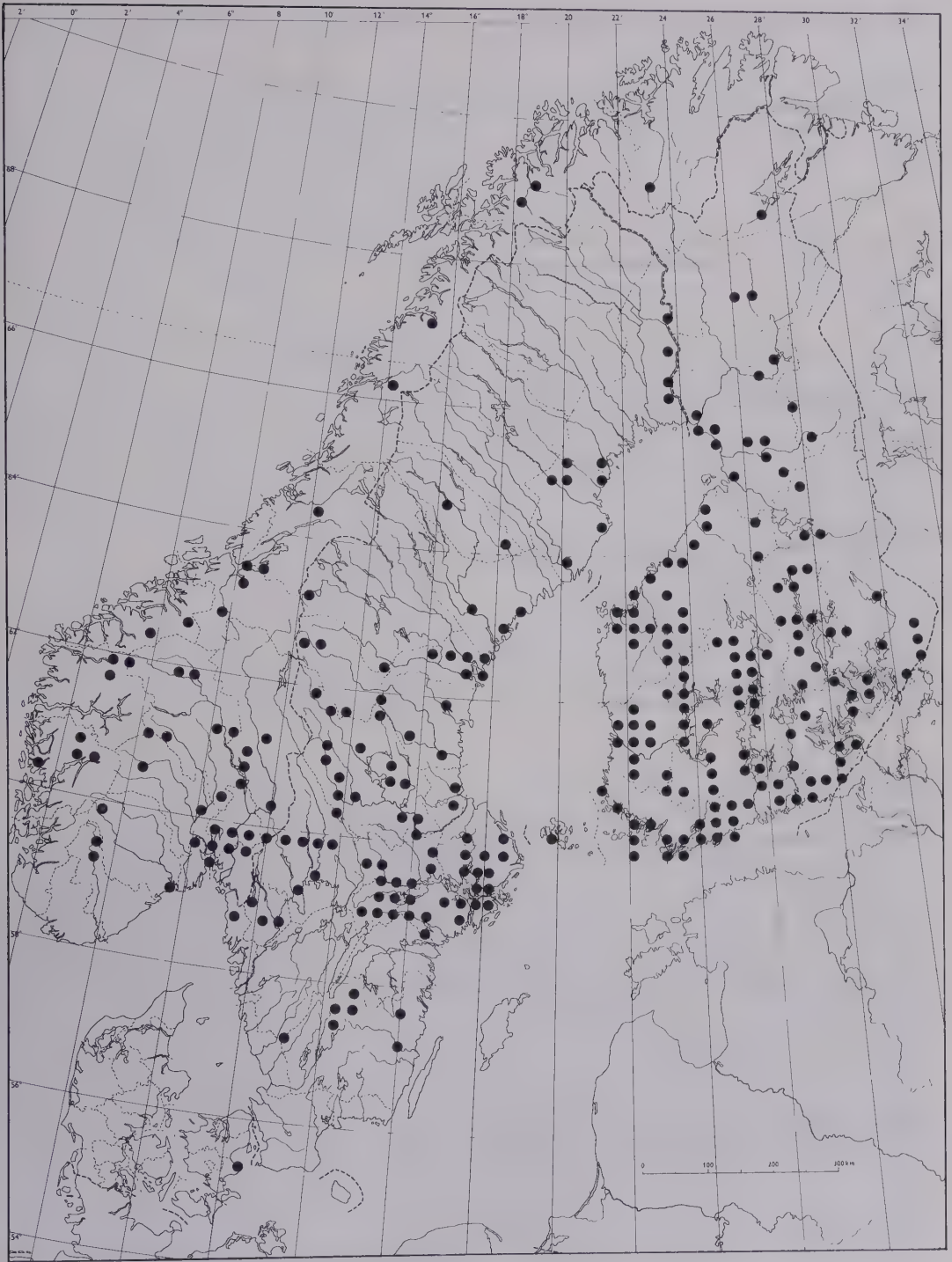


Fig. 15. *Phaeophyscia ciliata*, Norway, SoFj, Moberg 1611a (UPS, herb. Möb.).



Map 3. *Phaeophyscia ciliata*

Physcia norrlini Vain. 1921: 3. – Lectotype (sel. here): U.S.S.R, Karelia onegensis, Mundjärvi, 1870 Norrlin (H).

Physcia obscura f. *gibbosa* Räs. 1939: 97. – Holotype: U.S.S.R, Karelia ladog., Kurkijoki Hämeenlahti Linnavuori, 1934 Räsänen (H). Isotype H.

Lichen ulothrix Ach. 1798: 113. – Illeg. superfluous name (*Lichen ciliatus* Hoffm.)

Thallus usually orbicular, up to 5 cm across, grey brown to dark brown, more or less closely appressed to the substratum. Lobes radiating, up to 1.5 mm broad, mostly flat, distinctly separated or sometimes overlapping. Underside black, with black simple rhizinae, which sometimes project beyond the margins. Neither soralia nor isidia present, but the thallus may sometimes be tubercular or wrinkled towards the centre. Upper and lower cortex paraplectenchymatous.

Apothecia common, usually numerous, up to 3 mm across, often with rhizinae on the underside (corona). Spores $20\text{--}26 \times 8\text{--}12\ \mu\text{m}$.

Pycnidia common, more or less immersed. Pycnoconidia $2\text{--}4 \times 1\ \mu\text{m}$.

Chemistry: no lichen substances found.

Short characterization: Middle-sized, $\pm$ broad-lobed, non-sorediate, non-isidiate, richly fertile, apothecia large with dense "corona". Corticolous.

DISTRIBUTION AND HABITAT. In nordic countries *Ph. ciliata* is predominantly an eastern or north-eastern species with rather few records from other areas (Map 3). It prefers trunks and branches of *Populus tremula* but occurrences on other deciduous trees are not uncommon.

REMARKS AND AFFINITIES. Until the treatment of the brown *Physcia* species in Scandinavia by Du Rietz (1925b: 79), various names were used for *Ph. ciliata* and in Catalogus (Zahlbruckner 1931: 658) it was still treated as a variety of *Physcia obscura* (cf. *Ph. orbicularis*). However, since Lynge (1935) the correct epithet and species rank have been accepted.

No authentic material on which Hoffman based his description has been located and the cited figures are not suitable to serve as types. Therefore a neotype has had to be selected, and in spite of the substrate, the material of Malme's Lich. Suec. exs. n. 309 in UPS coincides very closely with both the description and the figure in Enumeratio Lichenum.

As earlier stated (Moberg 1969: 342), the type material of *Physcia norrlini* is a specimen of *Ph. ciliata* in very bad condition. The same maculate and discoloured upper cortex has also been observed on apparently dying parts of otherwise normal thalli of *Ph. ciliata*.

Two other taxa which have to be referred to *Ph. ciliata* are *Physcia concrustans* and *Physcia obscura* f. *gibbosa*. Evidently they were separated from *Ph. ciliata* because they have tuberculate central parts, but, as stated in the description above, such a modification is included in the known variation.

The sorediate species, *Ph. orbicularis*, is probably the most closely related, and nothing but a minor difference in chemistry seems to oppose the suggestion to regard these species as a species pair (Poelt 1970: 191).

EXSICCATA EXAMINED: Malme, Lich. Suec. 309 (C, H, LD, S, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 807 (BM, C, H, LD, O, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 43 (H, KUO, LD, MIN, OULU, TUR, UPS), 183 (BM, H, KUO, LD, MIN, OULU, TUR, UPS), 708, 709, 862, (C, H, KUO, LD, OULU, TUR, UPS), 911 (H, KUO, LD, OULU, TUR). – Sommerfelt, Pl. crypt. Norv. 68 (H, O, TRH, UPS). – Vězda, Lich. sel. 475 (H, LD, UPS).

SPECIMENS EXAMINED: (lists with complete data in UPS and S):

Sweden. Sm, 11. – Ög, 1. – Bh, 1. – Dls, 15. – Vrm, 16. – Nrk, 19. – Srm, 33. – Upl, 49. – Vsm, 14. – Dlr, 30. – Gstr, 4. – Hls, 8. – Mpd, 18. – Äng, 5. – Hrrj, 4. – Jmt, 1. – Vb, 14. – Nb, 5. – ÅsL, 2. – Norway. Östf, 1. – Akh, 18. – Hdm, 5. – Opl, 16. – Busk, 6. – Vestf, 1. – Tel, 2. – AuAgd, 2. – Hrd, 7. – SoFj, 4. – MöRo, 2. – STrd, 10. – NTrd, 4. – Nrd, 3. – Trs, 4. – Fnm, 1. – Finland. Al, 1. – Ab, 23. – Nyl, 79. – Ka, 9. – St, 36. – Ta, 53. – Sa, 21. – Oa, 15. – Tb, 21. – Sb, 40. – Kb, 14. – Om, 22. – Ok, 2. – Ob, 26. – Ks, . – Ek, 3. – Li, 1. – Denmark.

***Phaeophyscia constipata* (Norrl. et Nyl.) Moberg
comb. nov.**

Fig. 16, Map 4

Physcia constipata Norrl. et Nyl. 1882 n. 218 (new name for *Physcia ulothrix* * *subciliaris* Nyl. in Norrl. 1876: 20). – Lectotype (sel. here): USSR, Karelia one-gensis, Walkeamäki, 1870 Norrlin (H, herb. Nyl. n. 31949). Isolectotype H.

Non *Physcia muscigena* var. *constipata* Nyl. in Norrl. 1873: 326. – Illeg. superfluous name (*Physcia pulverulenta* δ *tenuis* Th. Fr. 1871: 137).

Thallus irregular in shape and size usually fruticose and strongly branched forming small tufts on the ground. Colour greenish brown to brown, often very variable within the same thallus. Lobes long and ascending, up to 1 mm broad, very fragile. Neither soredia nor isidia present. Underside whitish with a few white to blackish rhizinae mainly along the margins of the lobes, usually provided with pustules containing algae. Upper and lower cortex paraplectenchymatous.

Apothecia very rare, up to 2 mm across. Spores 17–23 $\times$ 7–11 μ m.

Pycnidia rare, $\pm$ immersed. Pycnoconidia 2–4 $\times$ 1 μ m.

Chemistry: no lichen substances found.

Short characterization: Fruticose appearance, greenish colour, narrow-lobed, non-sorediate, non-isidiate, pale underside with few rhizinae, very rarely fertile. Terricolous. Calcicolous.

DISTRIBUTION AND HABITAT. *Ph. constipata* is a rare species in Fennoscandia (Map 4). It grows directly on the ground or among mosses on stone in dry slopes, obviously with a high content of lime, cf. Du Rietz (1925a: 7). The distribution in Eastern Fennoscandia has been mapped by Hakulinen (1966: 189).

REMARKS AND AFFINITIES. At the specific level the name *Ph. constipata* originates from the label of Herb. Lich. Fenn. exs. n. 218. As *Physcia muscigena* var. *constipata* was not cited, the name can be regarded as a new epithet (Code Art 72 Note) validated by the reference to the description of *Ph. ulothrix* ssp. *subciliaris* (Art. 32). *Physcia muscigena* var. *constipata* Nyl. has to be rejected as being a superfluous name of *Physcia pulverulenta* var. *tenuis* Th. Fr. a nomenclatural synonym of *Parmelia solenaria* Ach. (Cf. Excluded names and Zahlbruckner (1931: 326)).

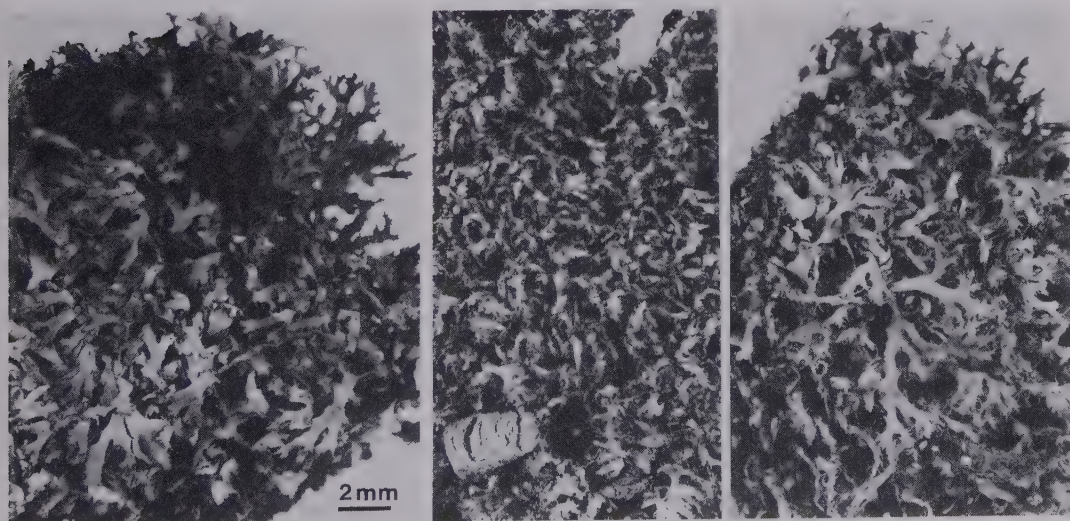


Fig. 16. *Phaeophyscia constipata*, Norway, STRd, Moberg 1084 (UPS, herb. Mob.).



Map 4. *Phaeophyscia constipata*

Symb. Bot. Upsal. XXII:1

In Fennoscandia *Ph. constipata* seems very isolated concerning appearance and habitat. However, this apparent isolation is merely superficial because, concerning both thallus anatomy and growth-form, it agrees very closely with *Ph. nigricans* (the size excluded), a fact previously indicated by Nádvořník (1947: 107) and Frey (1963: 468). Earlier this species has been compared with the *Physconia* species (cf. Du Rietz 1925b: 79 and Lynge 1935: 167) but the type of pycnoconidia clearly separates it from that group.

EXSICCATA EXAMINED: Krypt. exs. Vind. 2289b (C, H, LD, S, UPS). – Magnusson, Lich. sel. 38 (C, H, LD, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 218 (C, H, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 1062 (C, H, LD, O, OULU, TUR, UPS).

SECIMENS EXAMINED (lists with complete data in UPS and S): Sweden. *Nrk*, Glanshammar, 19; Lillkyrka, 4. – *Vsm*, Arboga, 12. – *TL*, Jukkasjärvi, Paddos, 26; Vitt-jätjåkko, 2; Abiskosuolo, 1. – Norway. *Hdm*, Rings-

aker, 1; Helgöya, 1. – *Opl*, 35. – *Fnm*, Alta, Storsvigneset, 1; Kautokeino, Masi, 1; Habatvuooppebakke, 1; Tana, Hammersjord, 1; Vadsö, Naversodden, 1. – Finland. *Ks*, 30. – *Le*, Enontekiö, Enontekiö, 2; Pah-tavaara, 3; Kilpisjärvi, 4. – *Li*, Inari, Skiehttsanjoki, 1; Utsjoki, Kevojoki, 10.

***Phaeophyscia endococcina* (Kbr.) Moberg comb. nov.**

Fig. 17, Map 5

Parmelia endococcina Kbr. 1859: 36. – *Physcia endococcina* (Kbr.) Th.Fr. 1866: 150. – Holotype: Tirol, Botzen, Hausmann (L).

Physcia lithotodes Nyl. 1875: 360. – Lectotype (sel. here): Finland, Papinsaari, 1872 Lang (Vainio) (H, herb. Nyl. n. 31948).

Physcia endochroidea Nyl. 1875: 442. – Lectotype (sel. here): Finland, Korpilahti, 1873 Lang (Vainio) (H, herb. Nyl. n. 32002).

Physcia decolor Kashiwadani 1975: 42. – Holotype: Finland, Ostrobothnia Kajanensis, Kianta, Suomula, Vainio (TUR, herb. Vain. n. 8360).

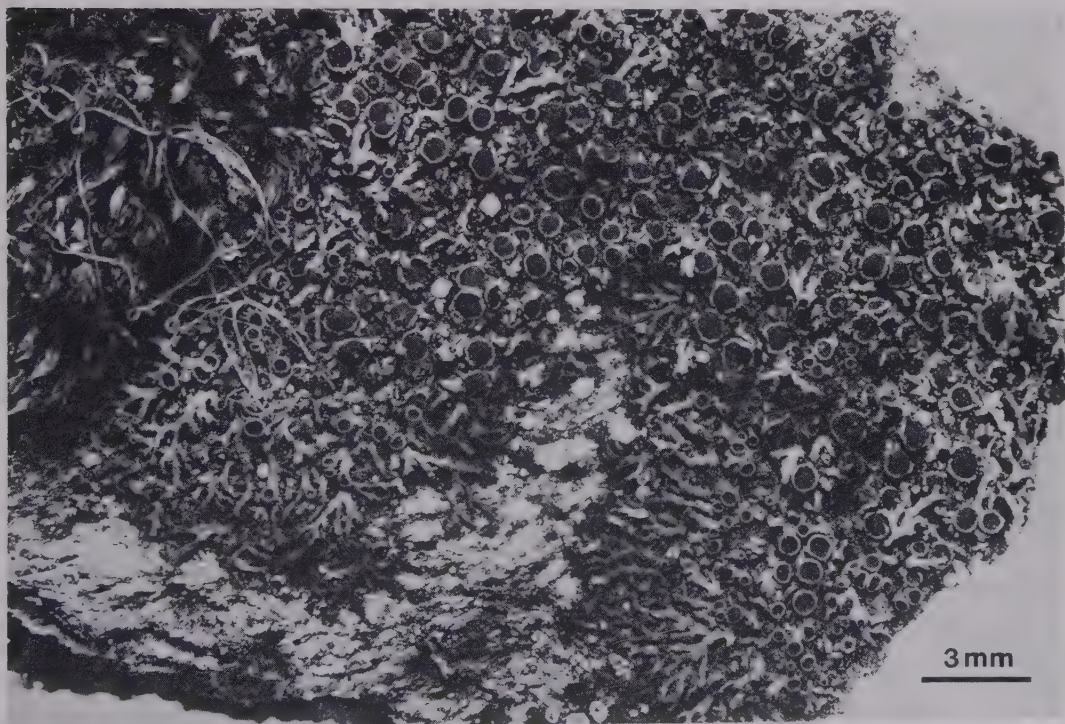


Fig. 17. *Phaeophyscia endococcina*, Sweden, Jmt, Moberg 2927 (UPS, herb. Mob.).



Map 5. *Phaeophyscia endococcina*

Symb. Bot. Upsal. XXII:1

Thallus usually orbicular, up to 3 cm across, often confluent with other thalli, mostly closely appressed to the substrate, brown to dark brown. Lobes usually distinctly separate, narrow, convex or flat. Underside black with black simple rhizinae. Upper and lower cortex paraplectenchymatous. Medulla often orange-red in the lower part.

Apothecia usually very abundant and crowded, up to 1.5 mm in diameter but mostly smaller, sometimes with crenulate or lobulate margins and rhizinae on the underside (corona). Spores $18-24(-27) \times 8-12 \mu\text{m}$.

Pycnidia common, $\pm$ immersed, pycnoconidia $2-4 \times 1 \mu\text{m}$.

Chemistry: medulla K+ dark red. Skyrin and zeorin present.

Short characterization: small-sized, convex and narrow-lobed, non-sorediate, non-isidiate, medulla $\pm$ orange-red, richly fertile, apothecia small with crenulate margins. Mostly epilithic.

DISTRIBUTION AND HABITAT. The species is scattered throughout the whole area (Map 5) but has been found more common towards the North. Usually it grows on stones but other substrates, such as lignum and trunks, are not uncommon.

REMARKS AND AFFINITIES. This species has previously been divided into two separate taxa, *Ph. endococcina* and *Ph. lithotodes*, depending on the presence or absence of a visible red or orange colour in the medulla. However, as already suspected by Lynge (1935: 137), and confirmed by the present study, no morphological differences could be found between coloured and uncoloured specimens. Moreover, small amounts of skyrin could sometimes be detected even in specimens which had no visible colouration in the medulla, and it is not uncommon to find that some part of a thallus has a red medulla while the rest of the same thallus has not. The reason for the difference in the skyrin-content is a matter for further examination but some observations may be discussed. Very often thalli which have grown in shade lack any trace of

colour in the medulla, while strongly exposed ones usually have a bright red medulla. It is also apparent that thalli with a coloured medulla become more common in northern parts of the area examined, whereas there is no sign that the substrate has any influence on the amount of skyrin formed.

The presence of zeorin in both coloured and uncoloured specimens also links them together and at the same time it sorts out modifications of other species. For instance, thalli of *Ph. sciastra* sometimes lack the typical isidia, and may then be misidentified as *Ph. endococcina*. However, by using TLC-test such specimens are easily distinguished.

Physcia endochroidea, a species described from this area, seems to have been overlooked by Lynge and other monographers, although accepted by Zahlbruckner (1931: 614). The type material is well accommodated within the known variation of *Ph. endococcina*.

Recently, Kashiwadani (1975) reported that the type material of *Ph. lithotodes* has an orange-red medulla and must be reduced to a synonym of *Ph. endococcina*. However, as he considered the colour of the medulla to be significant as a species character, he described a new species, *Physcia decolor*, on Fennoscandian material, differing from *Ph. endococcina* only in the lack of medullary pigment. The type material has been examined and, in spite of being scanty and poorly developed, there is no objection to include *Ph. decolor* as a synonym of *Ph. endococcina*, cf. discussion above.

In Fennoscandia, *Ph. endococcina* is easily separated from all other brownish species by the dense covering of small apothecia on the relatively small narrow-lobed thallus. However, a few specimens almost lack apothecia and thus could easily be confused with *Ph. sciastra* without isidia (see above).

EXSICCATA EXAMINED: Räsänen, Lich. Fenn. 245 (BG, C, H, LD, O, TUR, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. *Sm*, 2. – *Ög*, 7. – *Bh*, 9. – *Dls*, 5. – *Vmr*, 3. – *Nrk*, 4. – *Srm*, 6. – *Upl*, 23. – *Vsm*, 5. – *Dlr*, 16. – *Gstr*, 3. – *Hls*, 6. – *Mpd*, 7. – *Äng*, 6. – *Hrj*, 15. – *Jmt*, 26. – *Vb*, 4. – *Nb*, 2. – *ÄsL*, 7. – *LyL*, 11. – *PL*, 2. – *TL*, 16. – Norway. *Akh*, 5. – *Opl*, 16. – *Busk*, 3. – *Tel*, 1. – *AuAgd*, 2. – *Hrd*, 1. – *MöRo*, 3. – *STrd*, 21. – *Nrd*, 7. – *Trs*, 4. – *Fnm*, 4. – Finland. *Al*, 1. – *Ab*, 12. – *Nyl*, 31. – *Ka*, 3. – *St*, 6. – *Ta*, 12. – *Sa*, 2. – *Kl*, 9. – *Oa*, 1. – *Tb*, 4. – *Sb*, 11. – *Kb*, 6. – *Ok*, 1. – *Ob*, 20. – *Lk*, 2. – *Le*, 7. – *Li*, 2.

***Phaeophyscia endophoenicea* (Harm.) Moberg
comb. nov.**

Fig. 18, Map 6

Physcia obscura var. *endophoenicea* Harm. 1909: 645. – *Physcia endophoenicea* (Harm.) Santha 1928: 554. – Holotype: France, Voges, Le Roulier, 1909 Harmand (ANGUC).

Physcia labrata f. *minor* Mereschk. 1919: 183. – Lectotype (Moberg 1975: 67): Switzerland, Lugano, 1919 Mereschkovsky, Lich. Tic. exs. n. 63 (G). Isolectotypes BM, S, UPS.

Physcia ocellata Erichs. 1932: 75. – Holotype: Germany, Schleswig-Holstein, Husum, 1926 Erichsen (HBG).

Thallus greyish brown to dark brown, irregular in outline, often confluent with other thalli, mostly closely attached to the substrate except for the very tips of the lobe. Lobes elongated, up to 2 mm broad, overlapping or sometimes distinctly separated. Soralia predominantly apical and lip-shaped, sometimes laminal, usually

yellow to orange coloured by exposed medulla pigment. Underside black with black simple rhizinae. Upper and lower cortex paraplectenchymatous, medulla white, in the lower part usually more or less orange to red owing to the presence of skyrin.

Apothecia rare, spores c. $23\text{--}28 \times 9\text{--}11\ \mu\text{m}$.

Pycnidia $\pm$ immersed, rare, pycnoconidia c. $2\text{--}4 \times 1\ \mu\text{m}$.

Chemistry: medulla $\pm$ K+ dark red (note! The signs inverted by Moberg 1975: 68). Skyrin present in the medulla giving the orange to red colour.

Short characterization: middle-sized, $\pm$ broad-lobed, lipshaped soralia, medulla $\pm$ orange-red coloured, very rarely fertile. Corticolous. Rare.

This species has previously been discussed by Moberg (1975) and only a few additional points are included here.

The orange-red pigment in the medulla which was called rhodophyscin is evidently the same as skyrin, a well-known fungal substance (cf. chapter Chemical substances).

To the listed differences from *Ph. orbicularis* the almost total absence of pycnidia may be added. When growing mixed with *Ph. orbicularis* the lobes of the two species are easily separated by the presence or absence of pycnidia.

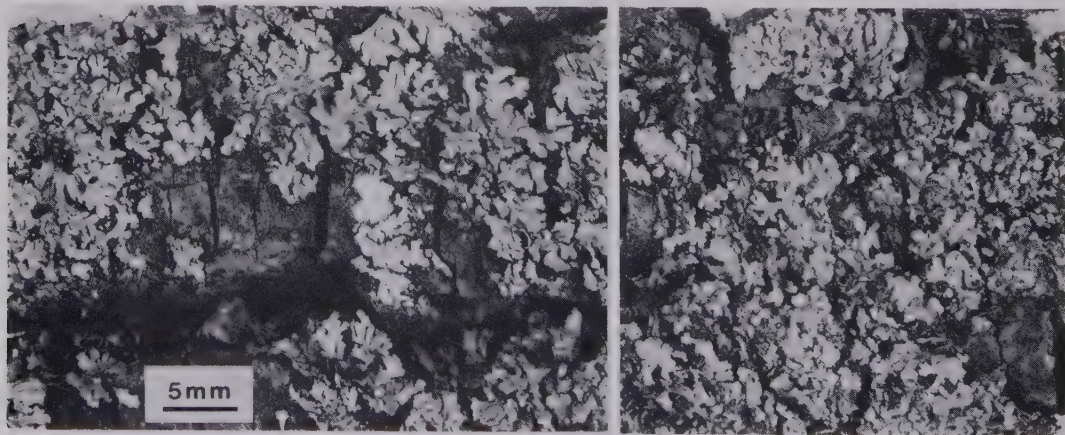


Fig. 18. *Phaeophyscia endophoenicea*, Sweden, Bh, Moberg 2327 (UPS, herb. Mob.).



Map 6. *Phaeophyscia endophoenicea*

Symb. Bot. Upsal. XXII:1

The additional records (see below) indicate a southern distribution rather than a suboceanic preference (Map 6).

EXSICCATA EXAMINED: Havaas, Lich. Norv. 484 (BG, C, H, UPS). – Magnusson, Lich. sel. 86 (BM, C, H, LD, S, UPS).

SPECIMENS EXAMINED (additional localities, see Moberg 1975). **Sweden.** *Sm*, Femsjö, Stenhammar (S). – *Hl*, Hasslöv, at the church, 1932 Magnusson 13767 (UPS). – *Vrm*, Svanskog, Sunnersrud, 1976 Sundell 11108 (UPS). – *Upl*, Tensta, at the parsonage, 1976 Du Rietz (UPS); 1976 Moberg 3390–91 (UPS). – **Norway.** *Rog*, Tysvaer, Tveit, 1970 Krog (O). – **Denmark.** *Sj*, Enrum, 1953 Henningsen (C). – **USSR.** *Kl*, Sortavala, Rauskee, 1907 Koponen (H).

***Phaeophyscia kairamoi* (Vain.) Moberg comb. nov.**

Fig. 19, Map 7

Physcia kairamoi Vain. 1921: 3. – Lectotype (sel. here): USSR, Lapponia ponojensis, Orlov, 1889 Kihlman (H).

Physcia ulothrix ** *pityrophylla* Nyl. in Norrl. 1876: 20. – Lectotype (sel. here): USSR, Karelia onegensis, Walkeamäki, 1870 Norrlin (H).

Physcia karakorina Poelt 1961: 92. – Holotype: Kashmir, Karakorum, Kutto Darukusch, 1959 Lobbichler 756 (M). – Isotype M.

Thallus irregular in shape, usually coalescent with other thalli, grey-brown to dark-brown, loosely attached to the substratum. Lobes irregularly branched, very variable in size, rarely with hyaline hairs on narrow lobes. Isidia marginal or sometimes laminal and covering considerable parts, usually developing into ciliate lobules. Underside black with long, black, simple rhizinae which usually project beyond the margins. Upper and lower cortex paraplectenchymatous. Medulla white.

Apothecia $\pm$ common, up to 3 mm across, usually with rhizinae projecting from the underside (corona). Spores $20\text{--}24(-27) \times 10\text{--}12(-15) \mu\text{m}$.

Pycnidia common, $\pm$ immersed, pycnoconidia $2\text{--}4 \times 1 \mu\text{m}$.

Chemistry: no lichen substances found.

Short characterization: small-sized to middle-sized, narrow to broad-lobed, isidiate to lobulate at margins $\pm$ fertile, epilithic. Rare.

Ph. kairamoi has previously been discussed by Moberg (1969 and 1974) and here only a map (Map 7) and a list of additional localities are presented as a summary of the known distribution. The discovery of additional material from

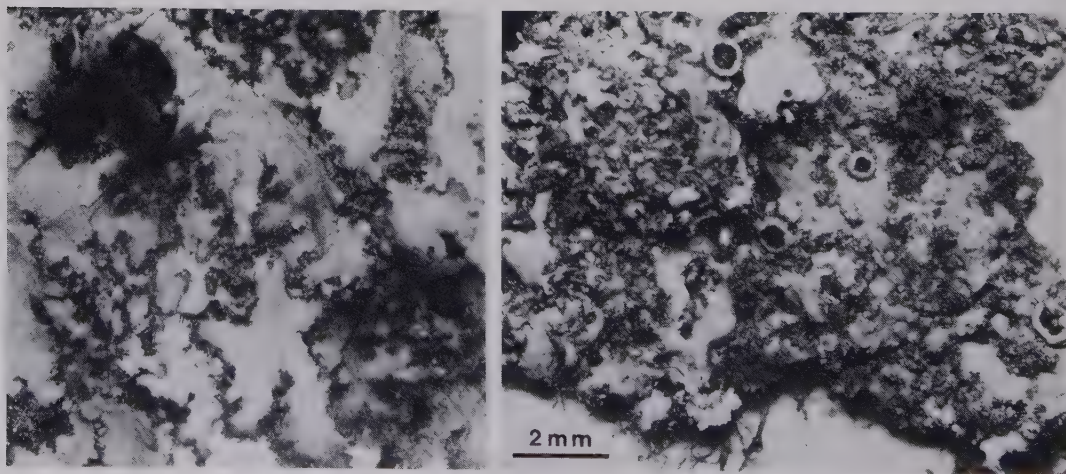


Fig. 19. *Phaeophyscia kairamoi*, Sweden, Jmt, Moberg 996 (left), 1012 (right, both UPS, herb. Mob.).



Map 7. *Phaeophyscia kairamoi*

the type locality in S is very valuable as the type is not in very good condition.

SPECIMENS EXAMINED (additional localities, see Moberg 1969, 1974): Norway. *Hdm*, Folldal, Folldal, 1969, Rui 15594 (O); Dalholen, 1974 Rui 19991 (O); Tynset, Havern, 1910 Lyng (O). – *Opl*, Sör-Fron, Rudtand, 1938 Ahlner (S). – *STrd*, Røros, Skaarkamerda, 1924 Vrang (S).

***Phaeophyscia nigricans* (Flk.) Moberg comb. nov.**

Fig. 20, Map 8

Lecanora nigricans Flk. 1819b: 10. – *Physcia nigricans* (Flk.) Stiz. 1882: 329. – Lectotype (sel. here): Germany (Berlin or Rostock) Floerke, Deutsche Lich. n. 91 (UPS).

Physcia tremulicola Nyl. 1874: 7. – *Ph. nigricans* var. *tremulicola* (Nyl.) Lyng 1935: 150. – Lectotype (sel. here): Norway, Dovre, Toftemoen, 1870 Zetterstedt (H, herb. Nyl. n. 31988). – Isolectotype UPS.

Physcia parvula Vain. 1878: 52. – Lectotype (sel. here): USSR, Karelia austr., Viborg, Tervaniemi, 1875 Vainio (TUR, herb. Vain. n. 8478).

Physcia pterygoides Vain. 1878: 53. – Lectotype (sel. here): USSR, Karelia austr., Viborg, horto Monrepo, 1875 Vainio (TUR, herb. Vain. n. 8448).

Parmelia obscura f. *sciastrella* Nyl. in Arn. 1874: 569 (nomen nudum, validated by Kieffer 1895: 61.) – *Physcia sciastrella* (Nyl.) Harm. 1909: 651. – *Ph. nigricans* var. *sciastrella* (Nyl.) Lyng 1935: 150. – Lectotype (sel. here): Germany, Eichstätt, 1874 Arnold, Lich. exs. n. 583 (M). Isolectotype UPS.

Physcia tribacella Nyl. 1874b: 307. – Lectotype (sel. here): France, Chalons sur Marne, 1874 Brisson (H, herb. Nyl. n. 31986).

Physcia tremulicola **leptothallina* Vain. in Räs. 1921: 167. – *Physcia leptothallina* (Vain.) Zahlbr. 1931: 640. – Lectotype (sel. here): Finland, Ostrobothnia austr., Lapua churchyard, 1920 Räsänen (TUR, herb. Vain. 8471).

Physcia parvula f. *fusca* Räs. 1936: 33. – Lectotype (sel. here): USSR, Karelia ladogensis, Kurkijoki, Rahoma, Paratsu, 1935 Räsänen, Lich. Fenn. exs. 249 (H).

Thallus very small, orbicular, sometimes confluent with other thalli, usually loosely attached, grey-brown to brown. Lobes usually narrow and ascending, sometimes broader and $\pm$ appressed, the narrowest branches usually difficult to separate from true isidia. Isidia marginal often becoming sorediate. Underside greyish with sparse, pale to blackish rhizinae. Upper and lower cortex papaplectenchymatous.

Apothecia sparse, small, margin entire or sometimes with short lobules. Spores $17-22(-24) \times 8-11 \mu\text{m}$.

Pycnidia sparse, $\pm$ immersed, pycnoconidia $2-4 \times 1 \mu\text{m}$.

Chemistry: no lichen substances found.

Short characterization: small-sized, $\pm$ fruticose, very narrow-lobed, isidiate becoming $\pm$ soredi-

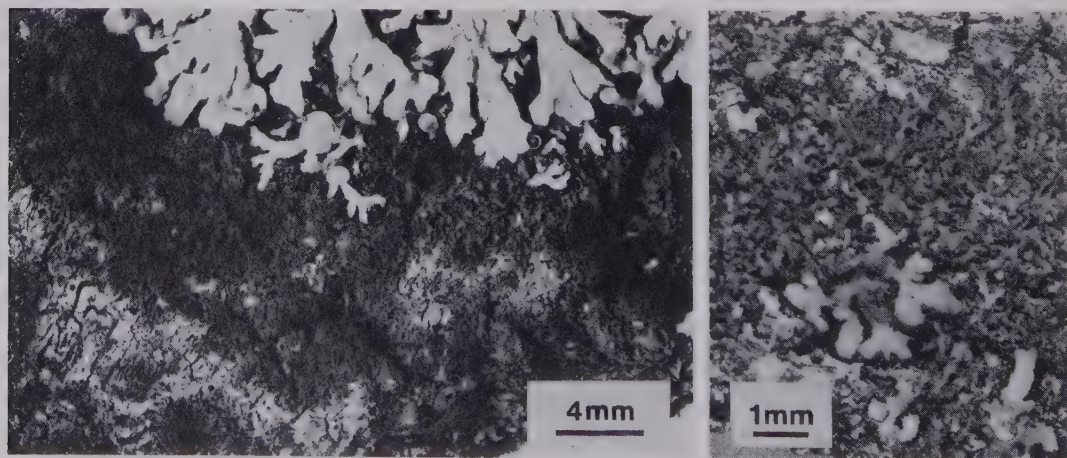
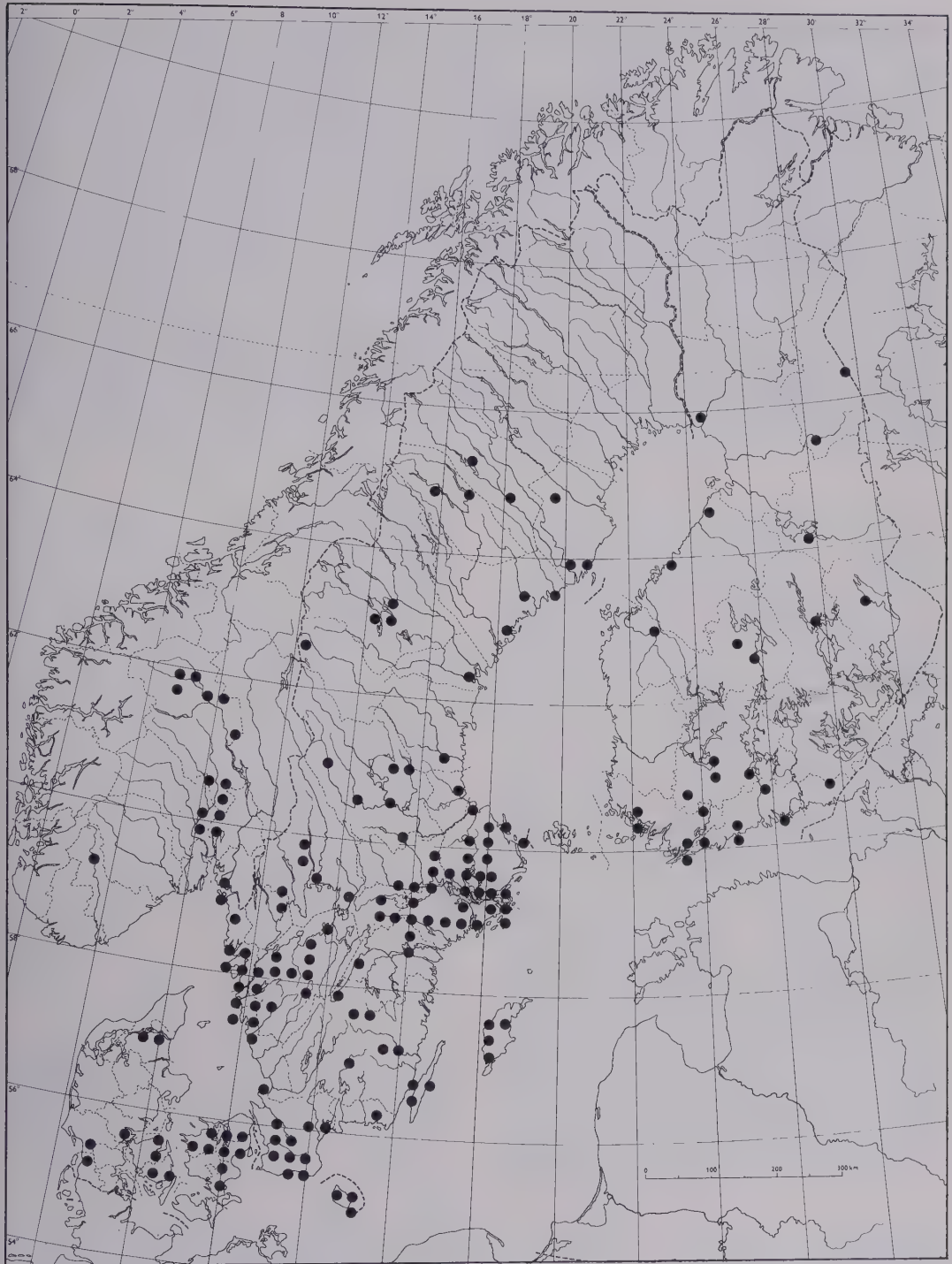


Fig. 20. *Phaeophyscia nigricans*, Norway, *Opl*, Moberg 1314c (left, UPS, herb. Mob.); Sweden, *Upl*, 1939 Ahlner (right, S).



Map 8. *Phaeophyscia nigricans*

ate, underside pale, rhizinae sparse, corticolous or on rocks.

DISTRIBUTION AND HABITAT. *Ph. nigricans* is mainly a southern species in Fennoscandia which reaches the central parts (Map 8). It is mostly found growing at the base of dust impregnated, solitary, deciduous trees, but may also be found on mortar or on more or less calcareous rocks. Very often it grows mixed with *Ph. orbicularis*.

REMARKS AND AFFINITIES. The minute size and considerable variation of this species is probably responsible for the description of several taxa, which from the study of extensive material are shown to be of no taxonomic value. So have *Physcia tremulicola*, *Ph. parvula*, *Ph. pterygoides* and *Ph. sciastrella* all been included in *Phaeophyscia nigricans* and the treatment of *tremulicola* and *sciastrella* at variety level (Lynge 1935: 150), founded on different width of the lobes, could not be maintained. Already Du Rietz (1925b: 71) was quite clear of the variation, but, as his paper was unfortunately in Swedish and as Lynge (1935: 148) did not fully understand the variation, the Du Rietz concept was overlooked by later monographers. The two varieties treated by Lynge (l.c. 150) cannot be maintained because transitional types are common.

The close relationship of *Ph. nigricans* to *Ph. constipata* is discussed under that species.

EXSICCATA EXAMINED: Havaas, Lich. Norv. 483 (BG, C, H, O, UPS). – Krypt. exs. Vind. 2970 (C, GB, H, LD, O, S, UPS). – Lojka, Lich. univ. 223, 224 (LD, S, UPS). – Magnusson, Lich. sel. 50 (C, H, LD, UPS), 312 (H, LD, S, UPS). – Malme, Lich. Suec. 840 (C, H, LD, S, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 217, 219 (C, H, LD, UPS), 556 (C, H, O, UPS), 557, 558 (C, H, LD, O, UPS). – Räsänen, Lich. Fenn. 247, 248, 249, 758 (C, H, KUO, LD, O, S, TUR, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 1013 (C, H, KUO, LD, OULU, TUR, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. *Sk*, 29. – *Bl*, 1. – *Sm*, 6. – *Öl*, 8. – *Gtl*, 10. – *Ög*, 3. – *Vg*, 48. – *Hl*, 8. – *Bh*, 19. – *Dls*, 1. – *Vrm*, 7. – *Nrk*,

8. – *Srm*, 19. – *Upl*, 88. – *Vsm*, 16. – *Dlr*, 11. – *Gstr*, 2. – *Hls*, 1. – *Mpd*, 1. – *Ång*, 8. – *Hrj*, 1. – *Jmt*, 6. – *Vb*, 3. – *ÅsL*, 2. – *LyL*, 2. – **Norway.** *Akh*, 2. – *Opl*, 19. – *Busk*, 3. – *AuAgd*, 1. – **Finland.** *Ab*, 31. – *Nyl*, 31. – *Ka*, 2. – *Ta*, 15. – *Sa*, 3. – *Oa*, 4. – *Tb*, 3. – *Sb*, 5. – *Kb*, 1. – *Om*, 2. – *Ok*, 1. – *Ob*, 5. – *Ks*, 2. – **Denmark.** *Jl*, 5. – *Fyn*, 4. – *Sj*, 17. – *Brnh*, 3.

***Phaeophyscia orbicularis* (Neck.) Moberg comb. nov.**

Fig. 21, 5D, Map 9

Lichen orbicularis Neck. 1768: 509. – *Physcia orbicularis* (Neck.) Poetsch in Poetsch und Schied. 1872: 247. – Neotypus (sel. here): France, Vendée, La Roche-sur-You, 1879 Richard (UPS).

Lichen obscurus Ehrh. ex Humb. 1793: 16. – *Physcia obscura* (Humb.) Fűrnröhr 1839: 249. – Lectotype (sel. here): Sweden, Uppsala, Ehrhart Pl. crypt. exs. n. 177 (M).

Lichen virellus Ach. 1798: 108. – *Physcia virella* (Ach.) Flag. 1891: 110. – Lectotype (sel. here): Sweden (H, herb. Ach. n. 1116, see Appendix Plate II).

Physcia obscura var. *sorediifera* Nyl. in Norrl. 1871: 180 (nomen nudum), Nyl. in Oliv. 1894: 90 (with descr.). – Lectotype (sel. here): Finland, Tavastia austr., Asikkala, 1862 Norrlin (H, herb. Nyl. 31930a).

Physcia obscura var. *virella* f. *hueiana* Harm. 1897: 262 (sep. pag. 235). – *Physcia hueana* (Harm.) Räs. 1951: 86. – Lectotype (sel. here): France, Houdemont, Harmand (ANGUC).

Physcia cycloselis f. *elongata* Räs. 1921: 167. – Holotype: Finland, Nyland, Korso, 1915 Räsänen (H). Isotype H.

Physcia orbicularis f. *tristis* Räs. 1936: 32. – Lectotype (sel. here): Räsänen, Lich. Fenn. exs. n. 244 (H).

Physcia orbicularis f. *pallida* Räs. 1939: 99. – Lectotype (sel. here): Finland, Tavastia austr., Tyrvättö, Lepaa, 1935 Räsänen (H).

Lichen cycloselis Ach. 1798: 113. – *Physcia cycloselis* (Ach.) Vain. ex Räs. 1931: 135. Illeg., superfluous name (*Lichen orbicularis* Neck.).

Thallus orbicular up to 3 cm across, sometimes confluent with other thalli, $\pm$ closely attached, pale-grey to dark-brown, occasionally yellowish (skyrin). Lobes radiating, up to 1 mm broad, overlapping or distinctly separated. Soralia laminar, sometimes marginal, $\pm$ capitate, sometimes spreading and covering large areas of the thallus, usually white but sometimes yellowish (skyrin). Underside black with black simple rhizinae, occasionally projecting beyond the mar-

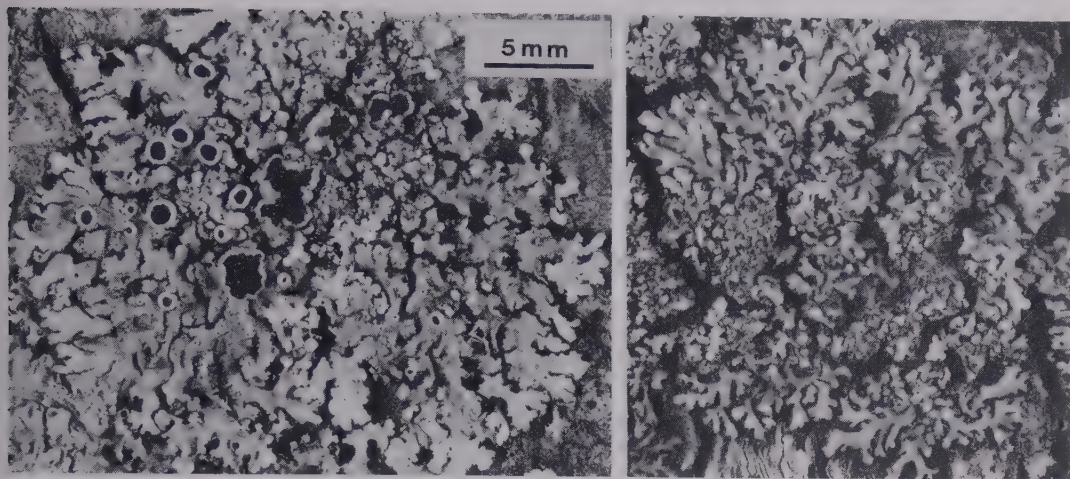


Fig. 21. *Phaeophyscia orbicularis*, Sweden, Gtl, Moberg 1200 (UPS, herb. Mob.).

gins. Upper and lower cortex paraplectenchymatous (Fig. 2A). Medulla white (without skyrin).

Apothecia $\pm$ common, up to 1.5 mm across, with or without rhizinae (corona) on the underside. Spores $18\text{--}26 \times 7\text{--}11\ \mu\text{m}$.

Pycnidia common, $\pm$ immersed, pycnoconidia $2\text{--}4 \times 1\ \mu\text{m}$.

Chemistry: negative except for the yellowish specimens where the upper side and soralia are K+ (dark red) depending on the presence of small amounts of skyrin (TLC).

Short characterization: middle-sized, $\pm$ broad-lobed, capitate sorediate, $\pm$ richly fertile, corticolous.

DISTRIBUTION AND HABITAT. *Ph. orbicularis* is very common in the whole area examined except for the northernmost parts (Map 9). It prefers trunks of various deciduous trees, especially *Populus tremula*, and trees impregnated by dust, but may also grow on stone especially in northerly coastal areas.

REMARKS AND AFFINITIES. No authentic material has been located (cf. also Stafleu 1967: 335) and as the figures cited in Necker are not suitable as type material, a neotype has been selected.

Until the treatment of Du Rietz (1925b: 79), *Ph. orbicularis* was given various incorrect names, such as, *Physcia obscura* and *Physcia virella*. However, the concept of Du Rietz was not accepted by Zahlbruckner (1931) but following the monographic treatment of the genus by Lynge (1935) the name *Ph. orbicularis* seems to have been accepted. In the present work some infraspecific names have been treated as synonyms of which only one—*hueiana*—will be discussed.

Forma *hueiana* has evidently been widely accepted as a separate taxon because of the yellow colour of the soralia and the upper side. But, as already stated by Moberg (1974: 288), all kinds of transitional states between coloured and uncoloured forms are to be found, so that f. *hueiana* should only be treated as a modification. Yellow soralia are also present in *Ph. endophoenicea* but in contrary to *Ph. orbicularis* they are always accompanied by red or orange medulla.

The most closely related species is probably *Ph. ciliata* (cf. *Ph. ciliata*) but there are undoubtedly close linked to other species as well (e.g. *Ph. endophoenicea*).

EXSICCATA EXAMINED: Ehrhart, Pl crypt. Linn. 177 (M). – Fries, Lich. Suec. 138 (LD, M, S, UPS), 205 (BM, LD, M, S, UPS). – Havaas, Lich. Norv. occ. 94



Map 9. *Phaeophyscia orbicularis*

Symb. Bot. Upsal. XXII:1

(BG, C, H, LD, TUR, UPS). – Krypt. exs. Vind. 2580 (BG, BM, C, H, LD, M, S, UPS). – Malmé, Lich. Suec. 158 (C, H, LD, M, S, UPS), 882 (C, H, LD, S, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 221 (C, H, LD, M, UPS), 222 (C, H, LD, UPS). – Räsänen, Lich. Fenn. 244 (BG, BM, C, H, KUO, LD, TUR, UPS), 918, 919 (BM, C, H, KUO, LD, M, TUR, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 184 (H, KUO, LD, M, MIN, OULU, TUR, UPS), 483 (BM, C, H, KUO, LD, M, OULU, TUR, UPS), 710 (C, H, KUO, LD, M, OULU, TUR, UPS), 911 (C, UPS). – Stenhammar, Lich. Suec. 211 (BM, M, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. *Sk*, 56. – *Bl*, 10. – *Sm*, 32. – *Öl*, 9. – *Gtl*, 29. – *Ög*, 8. – *Vg*, 86. – *Hl*, 10. – *Bh*, 48. – *Dls*, 35. – *Vrm*, 6. – *Nrk*, 18. – *Srm*, 52. – *Upl*, 51. – *Vsm*, 25. – *Dlr*, 16. – *Gstr*, 15. – *Hls*, 8. – *Mpd*, 22. – *Äng*, 5. – *Hrj*, 6. – *Jmt*, 12. – *Vb*, 7. – *Nb*, 2. – *ÅsL*, 6. – *LyL*, 1. – *TL*, 1. – **Norway.** *Östf*, 9. – *Akh*, 19. – *Hdm*, 4. – *Opl*, 36. – *Busk*, 7. – *Vestf*, 12. – *Tel*, 7. – *AuAgd*, 7. – *VAgd*, 3. – *Rog*, 8. – *Hrd*, 11. – *SoFj*, 10. – *MöRo*, 13. – *STrd*, 18. – *NTrd*, 18. – *Nrd*, 15. – *Trs*, 7. – *Fnm*, 8. – **Finland.** *Al*, 11. – *Ab*, 59. – *Nyl*, 130. – *Ka*, 7. – *St*, 16. – *Ta*, 49. – *Sa*, 19. – *Oa*, 15. – *Tb*, 20. – *Sb*, 36. – *Kb*, 12. – *Om*, 9. – *Ok*, 3. – *Ob*, 14. – *Ks*, 2. – *Lk*, 4. – **Denmark.** *Jl*, 18. – *Fyn*, 3. – *Loll*, 1. – *Flst*, 2. – *Mön*, 1. – *Sj*, 30. – *Brnh*, 11.

***Phaeophyscia sciastra* (Ach.) Moberg comb. nov.**

Fig. 22, 8, Map 10

Parmelia sciastra Ach. 1803: Suppl. p. 49. – *Physcia sciastra* (Ach.) Du Rietz 1921: 168. – Lectotype (sel. here): Sweden (H, herb. Ach. n. 1354, see Appendix Plate I). Isolectotype UPS.

Physcia obscura **ulothrix* f. *saxicola* Vain. 1878a: 100. – Lectotype (sel. here): Finland, Tavastia austr., Korpilahti, Rappukallio, 1875 Vainio (TUR, herb. Vain. n. 8338).

Physcia obscura f. *erigens* Vain. 1881: 133. – Lectotype (sel. here): Finland, Karelia bor., Lieksa, Matovaara, Vainio (TUR, herb. Vain. n. 8364).

Thallus irregular or orbicular, up to 5 cm across, usually closely attached to the substrate, often confluent with other thalli, grey-brown to dark-brown or almost black. Lobes radiating, narrow, up to 0.5 mm broad, mostly distinctly separated. Isidia marginal, occasionally laminal, sometimes

covering considerable parts of the thallus, exceptionally soredia-like, never with true soralia. Underside black with black simple rhizinae, occasionally projecting beyond the margins. Upper and lower cortex paraplectenchymatous.

Apothecia not uncommon, up to 3 mm across but usually smaller, sometimes with lobate margins, rarely with rhizinae on the underside (coróna). Spores 17–22(–24) × 8–12 µm.

Pycnidia ± common, immersed, pycnoconidia 2–4 × 1 µm.

Chemistry: no lichen substances found.

Short characterization: small-sized, narrow-lobed, isidiate (never lobulate), ± fertile. Epilithic.

DISTRIBUTION AND HABITAT. *Ph. sciastra* is common in the whole area (Map 10) but becomes more abundant to the North, particularly in the mountains. This is hardly shown by the map as this area is rather poorly recorded. It usually grows on acidic rocks and is evidently favoured by manuring by birds. Lignum is also a common substrate.

REMARKS AND AFFINITIES. The nomenclature of this species was quite confusing until the treatment of Du Rietz (1925b: 81) but, apart from the nomenclature the taxon seems to have been quite well understood which is proved by the few synonyms. Of course there are some misidentifications, especially of the non-isidiate specimens (cf. *Ph. endococcina*), but on the whole these are exceptionally few. This could perhaps be explained by the presence of isidia which it shares with only two other species in the area examined, the rare and little known *Phaeophyscia kairamoi* and the very small-sized *Ph. nigricans*. The relationship of *Ph. sciastra* with *Ph. kairamoi* was discussed by Moberg (1969: 342¹) and *Ph. kairamoi* is believed to be its closest relative.

¹ In the statement “no isidia on the margins” of the lobes of *Ph. sciastra* (the table) the word “no” should be excluded.



Fig. 22. *Phaeophyscia sciastra*, Sweden, Jmt, Moberg 2957 (left, UPS, herb. Mob.); Finland, Ab, 1963 Laine (right, TUR).

EXSICCATA EXAMINED: Havaas, Lich. Norv. 572 (BG, C, H, O, S, UPS). – Malme, Lich. Suec. 583 (LD, S, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 220 (C, H, LD, UPS). – Räsänen, Lich. Fenn. 96 (BG, C, H, KUO, LD, O, S, TUR, UPS), 97 (BG, C, H, O, TUR, UPS), 246, 441 (BG, C, H, KUO, LD, O, TUR, UPS), 920 (C, H, KUO, LD, O, TUR, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 401 (H, KUO, LD, O, TUR, UPS), 634 (C, H, KUO, LD, MIN, O, OULU, TUR, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. *Sk*, 1. – *Bl*, 3. – *Sm*, 8. – *Öl*, 2. – *Ög*, 3. – *Vg*, 12. – *Hl*, 6. – *Bh*, 19. – *Dls*, 8. – *Vrm*, 6. – *Nrk*, 5. – *Srm*, 15. – *Upl*, 43. – *Vsm*, 10. – *Dlr*, 19. – *Gstr*, 7. – *Hls*, 5. – *Mpd*, 26. – *Äng*, 1. – *Hrj*, 15. – *Jmt*, 27. – *Vb*, 3. – *Nb*, 6. – *ÄsL*, 4. – *LyL*, 18. – *LL*, 1. – *TL*, 32. – **Norway.** *Östf*, 2. – *Akh*, 15. – *Hdm*, 5. – *Opl*, 40. – *Busk*, 3. – *Vestf*, 1. – *Tel*, 1. – *AuAgd*, 2. – *VAgd*, 2. – *Rog*, 1. – *Hrd*, 6. – *SoFj*, 2. – *STrd*, 20. – *NTrd*, 1. – *Nrd*, 15. – *Trs*, 19. – *Fnm*, 34. – **Finland.** *Al*, 14. – *Ab*, 31. – *Nyl*, 49. – *Ka*, 1. – *St*, 5. – *Ta*, 18. – *Sa*, 4. – *Oa*, 3. – *Tb*, 5. – *Sb*, 19. – *Kb*, 12. – *Om*, 5. – *Ob*, 23. – *Ks*, 9. – *Lk*, 6. – *Le*, 13. – *Li*, 14.

Physcia (Schreb.) Michaux 1803: 326

Lichen sect. *Physcia* Schreb. 1791: 768, Ach. 1794: 252. – *Lichen* trib. *Physcia* Ach. 1798: 170 (nom. invalid.) – Type species (Thomson 1963: 5): *Physcia tenella* (Scop.) DC.

Thallus foliose, lobated, more or less loosely appressed, pale grey to dark grey, sometimes

with a whitish pruina. Underside white to pale brown, with whitish to dark brown rhizinae. Upper cortex of paraplectenchymatous type (Fig. 3), algae of *Trebouxia* type, medulla composed of loosely interwoven hyphae, lower cortex prosoplectenchymatous (Fig. 4) or rarely paraplectenchymatous.

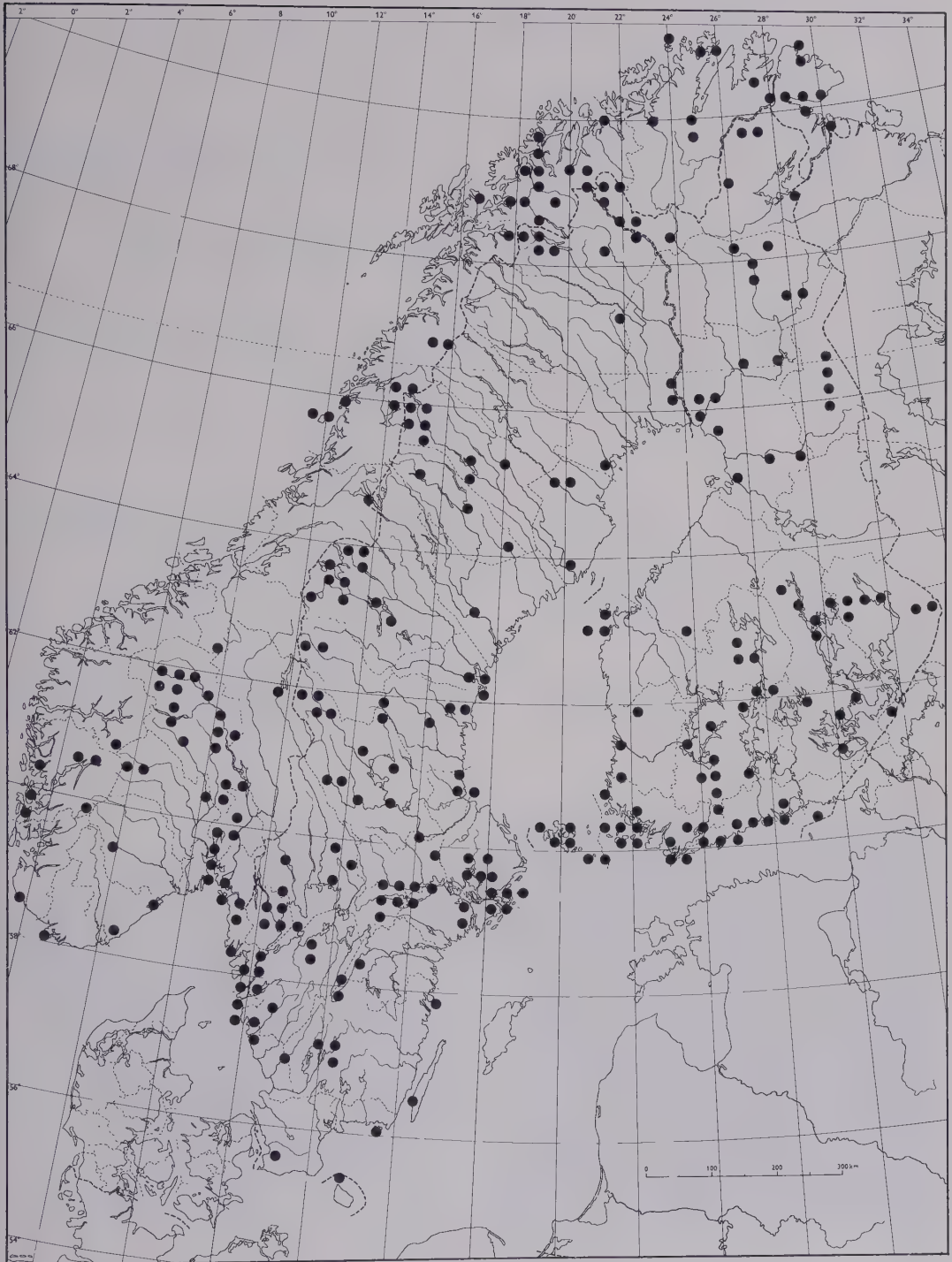
Apothecia lecanorine, laminal, sessile or short-stalked. Disc brown to black sometimes with a white pruina. Hymenium hyaline, hypothecium colourless. Asci cylindrical, 8-spored with brown, thick-walled, 1-septate spores (*Physcia*-type). Paraphyses $\pm$ branched, thickened and brown towards the apices.

Pycnidia immersed except for the blackened tips, pycnoconidia subcylindrical (Fig. 14C, D), more than 4 μ m long.

Chemistry: atranorin always present sometimes also zeorin.

Michaux (1803) was the first to treat *Physcia* at generic level. He cited word for word the description given by Acharius in *Prodromus* (1798). However, Acharius treated *Physcia* as tribus at infrageneric rank, which means that it is not validly published (Code Art. 5 and 33). In an earlier paper, where Acharius (1794) also treated *Physcia*, he cited Schreber (1791) and the basionym is, therefore *Lichen* sect. *Physcia* Schreb.

As Schreber did not cite any species and as the description in Michaux is founded on the



Map 10. *Phaeophyscia sciastra*

species listed by Acharius (1798) the type species has to be selected from one of Acharius' species. Such a species is *Physcia tenella* which was selected as the type by Thomson (1963: 5).

The subdivision of the genus has, except for sect. *Physcia* (*Tenella*) been based on different characters compared to the treatment of Lynge and his followers. Instead of using presence or absence and the type of the soralia as basic characters other morphological and chemical characters are considered to be more significant (see below). The same type of soralia may thus be found in species belonging to different sections. According to the Code (Art. 22) sect. *Tenella* has to be called sect. *Physcia*.

Key to the sections

1. Lobes with marginal cilia, usually ascending Sect. *Physcia*
- Lobes without marginal cilia, $\pm$ appressed 2
2. Medulla K+ yellow (atranorin present) Sect. *Caesia*
- Medulla K- (atranorin absent) 3
3. Spores narrowly ellipsoida with distinct ornamentation on the surface Sect. *Fusisporae*
- Spores not so Sect. *Stellares*

Section *Physcia*

Physcia sect. *Tenella* Lynge 1935: 96. — Type species: *Physcia tenella* (Scop.) DC.

This section is characterized by the presence of marginal cilia on the usually ascending lobes.

Physcia adscendens (Fr.) Oliv. 1882: 79.

Fig. 23, 6, Map 11

Pharmelia stellaris var. *adscendens* Fr. 1845: 105. — Lectotype (sel. here): Sweden (H, herb, Ach. n. 1428, see Appendix Plate I).

Physcia ascendens Bitt. 1901: 431. — Illeg. name, orthographic variant of *Ph. adscendens* (Fr.) Oliv. and thus later homonym.

Thallus orbicular or confluent with other thalli, usually loosely appressed, white-grey to dark grey. Lobes variable in size, sometimes long and narrow, sometimes shorter and broader, always with long marginal cilia. Underside white to pale brown, sparsely provided with blackend rhizinae. Soralia helmet-shaped, usually expanding on the underside forming rounded elevations visible from the upper side. Upper cortex para-

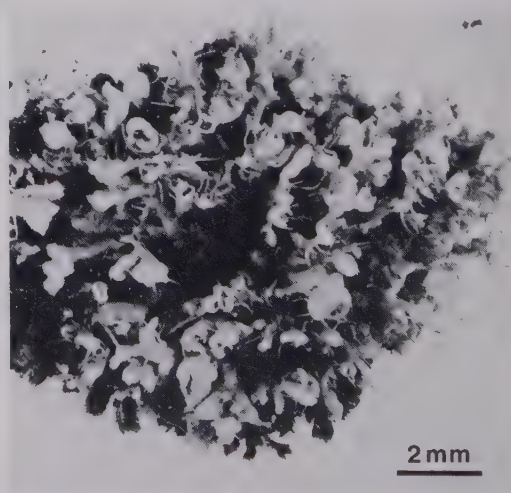
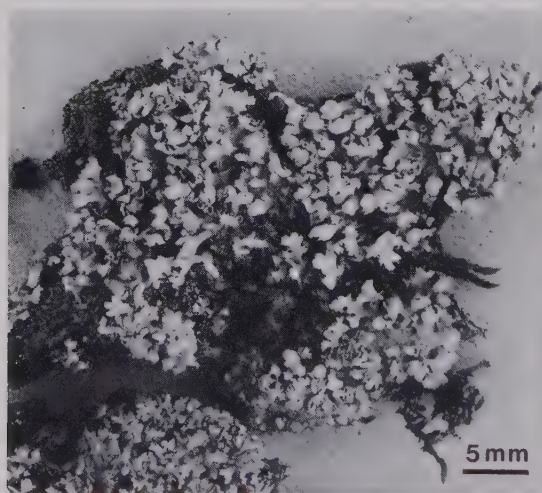


Fig. 23. *Physcia adscendens*, Sweden, Öl, Magnusson 22855 (left, UPS); Sweden, Sk, 1942 Almborn (right, UPS).



Map 11. *Physcia adscendens*

Symb. Bot. Upsal. XXII:1

plectenchymatous, lower cortex prosoplectenchymatous.

Apothecia not rare, stalked, up to 2 mm across. Spores $16-23 \times 7-10 \mu\text{m}$.

Pycnidia immersed, pycnoconidia $4-6 \times 1 \mu\text{m}$.

Chemistry: upper cortex K+ yellow. Atranorin present.

Short characterization: lobes ascending and ciliate, soralia helmet-shaped.

DISTRIBUTION AND HABITAT. *Ph. adscendens* is fairly common throughout the whole area examined, except for the northernmost parts (Map 11). It prefers trunks and branches of various deciduous trees, or may rarely grow on stone, especially when the stone is situated just beneath a tree.

REMARKS AND AFFINITIES. The difference between *Ph. adscendens* and *Ph. tenella* was first made clear by Bitter (1901) and he seems to have considered the species with helmet-shaped soralia as new, naming it *Ph. ascendens*. Unfortunately he chose an orthographic variant of the earlier *Ph. adscendens* (Fr.) Oliv. and according to the Code (Art. 64) *Ph. ascendens* is an illegitimate name.

The origin of *Ph. adscendens* is *Parmelia stellaris* var. *adscendens* Fr. which has earlier been regarded as a nomen nudum (e.g. Lynge, 1935: 96). However, in accordance with the Code (Art. 32) it is validated by the reference to *Borreria tenella* α (Ach. 1810: 498) and by adopting Art. 72 Note, var. *adscendens* Fr. is treated as new. A lectotype is selected from the material in Acharius' original herbarium (H) on which the description is based.

The oldest name used in connection with this and other ciliate species is *Lichen hispidus* Schreb. (1771: 126). Zahlbruckner (1931: 626) regarded it to be the same as *L. tenellus* Scop. which means the species with lip-shaped soralia, but both Lynge (1935: 97) and Frey (1963: 439) are of the opinion that it ought to be the name of the species with helmet-shaped soralia. Unfortunately, there seems to be no authentic material

in Schreber's original herbarium (M) and the description does not clearly indicate which of the two species should be connected with the epithet. Therefore, *L. hispidus* has to be regarded as a name which has been used in different senses and becomes a long-persistent source of error (Code Art. 69). Cf. also Maas Geesteranus (1952: 237) and Thomson (1963: 34).

Ph. adscendens is usually easily separated from related species by the very characteristic soralia, although in young states it may be difficult to separate it from young thalli of *Ph. tenella* and sometimes the upper cortex breaks leaving an almost lip-shaped opening. However, in contrast to the more crenulate and ascending lobetips of *Ph. tenella*, *Ph. adscendens* as a rule seems to have more even and downwardly bent tips. A slight tendency to be more often sterile and with fewer pycnidia is also a notable feature of *Ph. adscendens*. *Ph. adscendens* and *Ph. tenella* often grow side by side and the differences between them are then easily studied.

EXSICCATA EXAMINED: Havaas, Lich. Norv. 482 (BG, C, O, UPS). – Havaas, Lich. Norv. occ. 95 (BG, C, LD, UPS). – Magnusson, Lich. sel. 413 (LD, S, UPS). – Malme, Lich. Suec. 157 (C, LD, S, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 550 (C, H, LD, UPS). – Räsänen, Lich. Fenn. 92 (BG, C, H, TUR, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 481, 562, 912 (C, H, KUO, LD, OULU, TUR, UPS), 1214 (C, H, LD, OULU, TUR, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. Sk, 39. – Bl, 8. – Sm, 16. – Öl, 17. – Gtl, 22. – Ög, 5. – Vg, 55. – Hl, 3. – Bh, 24. – Dls, 5. – Vrm, 11. – Nrk, 16. – Srm, 52. – Upl, 50. – Vsm, 12. – Dlr, 12. – Gstr, 6. – Hsl, 5. – Mpd, 18. – Äng, 2. – Hrj, 3. – Jmt, 5. – Vb, 4. – Nb, 1. – ÅsL, 3. – **Norway.** Östf, 13. – Akh, 29. – Hdm, 2. – Opl, 15. – Busk, 5. – Vestf, 7. – Tel, 4. – Rog, 4. – Hrd, 11. – SoFj, 2. – MöRo, 3. – STrd, 11. – NTrd, 2. – Fnm, 1. – **Finland.** Al, 22. – Ab, 51. – Nyl, 109. – Ka, 10. – St, 17. – Ta, 33. – Sa, 11. – Oa, 18. – Tb, 1. – Sb, 23. – Kb, 10. – Om, 12. – Ob, 11. – Ks, 3. – Lk, 4. – **Denmark.** Jl, 33. – Fyn, 4. – Loll, 2. – Mön, 2. – Sj, 24. – Brnh, 13.

Physcia tenella (Scop.) DC. in Lamarck et DC. 1805: 396.

Fig. 24, 25

Lichen tenellus Scop. 1772: 394. – Neotype (sel. here): Moravia, Mor. Herálec, 1942 Nádvořník, *Physc. exs.* n. 8 (UPS).

Borrera tenella γ *exemta* Ach. 1810: 499. – Holotype: Germany (Lusatia, H, herb. Ach. n. 1431, see Appendix Plate I).

Physcia stellaris var. *marina* E. Nyl. 1857: 86. – Lectotype (sel. here): Finland, Korpo, Jurmo, 1853 E. Nylander (H).

Physcia marina var. *protuberans* Räs. 1939: 95. – Lectotype (sel. here): USSR, Karelia ladogensis, Valamo, Mustaniemi, 1923 Räsänen (H).

Physcia stellaris var. *subobscura* Nyl. 1858: 239. – *Physcia subobscura* (Nyl.) Nyl. 1869: 389. – Illeg. superfluous name (*Physcia stellaris* var. *marina* E. Nyl.)

Physcia marina (E. Nyl.) Lynge in Zahlbr. 1916: 217. – Illeg. name, later homonymy of *Physcia marina* (Wedd.) Arn. (= *Caloplaca* m.)

Thallus small and orbicular, often coalescent with other thalli and covering larger areas, white-grey to very dark grey, loosely appressed to the substrate. Lobes ascending, sometimes long and narrow, sometimes short and broader with $\pm$ long marginal cilia. Underside white to brownish with sparse white to brown sometimes blackend rhizinae. Soralia lip-shaped, often with reflexed margins. Upper cortex paraplectenchymatous; lower cortex prosoplectenchymatous.

Apothecia not uncommon, usually stalked, up to 2 mm in diameter. Spores (14–)17–21 $\times$ 7–10 μ m.

Pycnidia more or less common, usually immersed. Pycnoconidia 4–5 $\times$ 1 μ m.

Chemistry: cortex K+ yellow. Atranorin present.

Short characterization: lobes ascending and ciliated, soralia lip-shaped. Corticolous or saxicolous.

REMARKS AND AFFINITIES. Although the delimitation of *Physcia tenella* has been ascribed to Bitter (1901: 431) it is obvious from the diagnosis of *Lichen tenellus* (Scopoli l.c.) that the taxon with

reflexed sorediate lobe-tips was meant ("apice reflexa et pulverulenta"). That feature is regarded here as the most important in separating this species from other ciliate *Physcia*-species, and as no authentic material seems to be left, a neotype corresponding to Scopoli's description has been selected. The citation of various figures by Scopoli has been judged to be of minor importance especially as they represent different taxa.

Concerning *Lichen hispidus* Schreber (1771: 126), treated as *Physcia hispida* (Schreb.) Frege by several authors (cf. Zahlbruckner 1931: 626), see *Ph. adscendens*.

The most closely related species is *Ph. adscendens* from which it is separated by the type of soralia (cf. *Ph. adscendens*). Occasionally, the considerable variation in *Ph. tenella* has been misunderstood and modifications with broad and sparsely ciliate lobes are often identified as *Ph. dubia*. The dull upper-side and the presence of at least a few cilia separate these modifications from *Ph. dubia* which has a more shiny upperside and a total absence of cilia.

Within *Physcia tenella* two varieties have been separated. Var. *tenella* is the corticolous taxon usually named *Ph. tenella* by earlier authors. Var. *marina* is the saxicolous taxon earlier named *Ph. marina* or *Ph. subobscura*. The close affinities to var. *tenella* make it impossible to maintain the taxon as a species of its own and as the differences between the taxa (see below) probably are induced by the different habitat the rank of variety appears to be the most appropriate level.

Thallus pale grey to grey, corticolous, rarely saxicolous *Ph. tenella* var. *tenella*
Thallus dark grey, on sea-shore rocks
..... *Ph. tenella* var. *marina*

Var. *tenella*

Fig. 24, Map 12

Lichen tenellus Scop. – *Borrera tenella* γ *exemta* Ach.

Bibliography and types, see under the species.

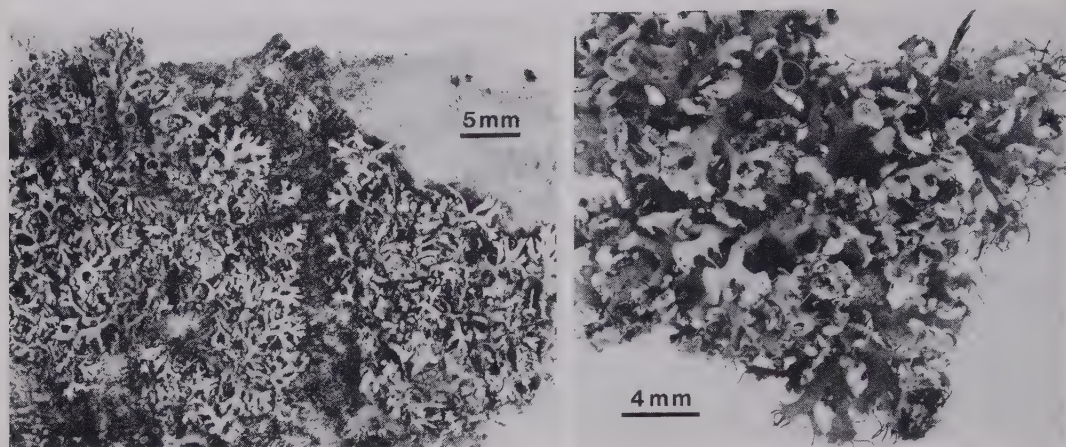


Fig. 24. *Physcia tenella* var. *tenella*, Sweden, Vg, Magnusson 15589 (left), 15784 (right, both UPS).

Thallus orbicular or confluent with other thalli, white-grey to dark grey. Lobes sometimes long and narrow, sometimes short and broad, ascending with $\pm$ long marginal cilia. Underside white to pale brown with sparse white to dark brown rhizinae.

DISTRIBUTION AND HABITAT. Var. *tenella* is present in the whole area but becomes rare in the northern parts (Map 12). It prefers trunks and branches of various deciduous trees but may rarely grow on stone.

For the differences between var. *tenella* and var. *marina* see under var. *marina*.

EXSICCATA EXAMINED: Havaas, Lich. Norv. 336, 541 (BG, C, O, UPS), 654 (BG, C, UPS). – Havaas, Lich. Norv. occ. 111 (BG, C, LD, S, UPS). – Malme, Lich. Suec. 156, 632 (C, LD, S, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 216 (C, H, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 633 (H, KUO, LD, MIN, OULU, S, TUR, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. Sk, 57. – Bl, 10. – Sm, 22. – Öl, 5. – Gtl, 10. – Ög, 3. – Vg, 68. – Hl, 12. – Bh, 34. – Dls, 6. – Vrm, 8. – Nrk, 15. – Srm, 48. – Upl, 44. – Vsm, 11. – Dlr, 9. – Hls, 3. – Äng, 6. – Jmt, 5. – Vb, 1. – ÄsL, 2. – LyL, 1. – **Norway.** Östf, 8. – Akh, 39. – Opl, 3. – Busk, 2. – Vestf, 10. – Tel, 6. – AuAgd, 4. – VAgd, 6. – Rog, 12. – Hrd, 36. – SoFj, 16. – MöRo, 26. – STrd, 36. – NTrd, 24. –

Nrd, 23. – Trs, 1. – **Finland.** Al, 16. – Ab, 49. – Nyl, 104. – Ka, 2. – St, 15. – Ta, 24. – Sa, 6. – Oa, 17. – Tb, 2. – Sb, 20. – Kb, 2. – Ob, 5. – **Denmark.** Jl, 53. – Fyn, 1. – Loll, 1. – Flst, 3. – Mön, 3. – Sj, 36. – Brnh, 19.

Var. *marina* (E. Nyl.) Lyng 1916: 41

Fig. 25, Map 13

Physcia stellaris var. *marina* E. Nyl. – *Physcia marina* var. *protuberans* Räs. – *Physcia stellaris* var. *subobscura* Nyl. (illeg.). – *Ph. subobscura* (Nyl.) Nyl. (illeg.). – *Ph. marina* (E. Nyl.) Lyng (illeg.).

Bibliography and types, see under the species.

Thallus in small orbicular tufts or confluent with other thalli and covering large areas, grey to very dark grey. Lobes narrow, ascending to almost erect with marginal blackend cilia. Soralia lip-shaped to weakly helmet-shaped. Underside pale to brownish with sparse usually black rhizinae.

Short characterization: colour dark grey, lobes ciliated and ascending, soralia lip-shaped. Saxicolous on shores.

DISTRIBUTION AND HABITAT. Var. *marina* is separated from var. *tenella* mainly because of its different habitat, more dense and tuft-like thal-



Map 12. *Physcia tenella* var. *tenella*

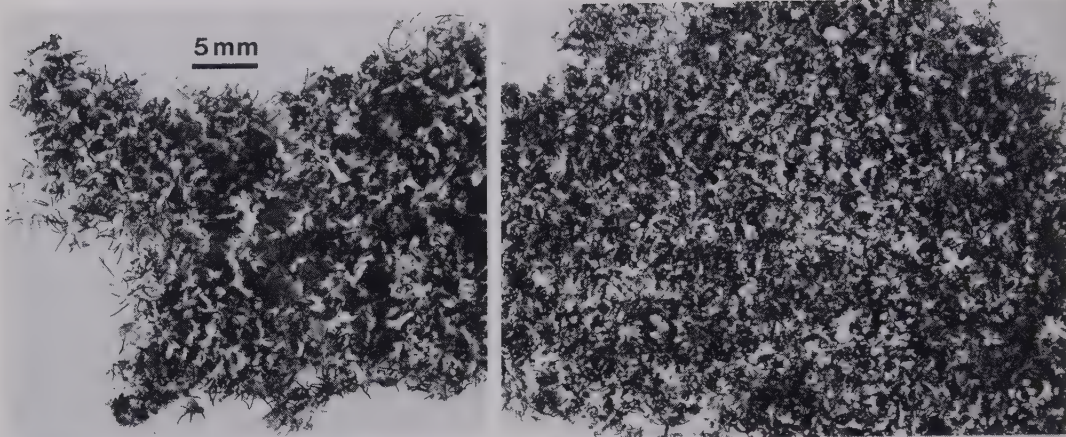


Fig. 25. *Physcia tenella* var. *marina*, Sweden, Bh, Santesson 24141 (UPS).

lus, and darker colour of lobes and cilia. Perhaps the morphological differences are induced by the more exposed habitat but the preference of sea-shore rocks is distinctly different from the preference of var. *tenella* which is rarely found growing on rocks in the area under study.

The distribution is presented on Map 13.

REMARKS AND AFFINITIES. This variety has been treated at species level either as *Physcia subobscura* or *Physcia marina* neither of which is correctly used. *Ph. subobscura* is, if regarded as a new combination of var. *subobscura*, illegitimate as the basionym is illegitimate. If regarded as a new name it could hardly be accepted as validly published. *Ph. marina* on the other hand is illegitimate being a later homonym of *Physcia marina* (Wedd.) Arn., a name which refers to *Caloplaca marina* (Wedd.) Zahlbr. (Nordin 1972: 11).

EXSICCATA EXAMINED: Fries, Lich. Suec. 294 (LD, S, UPS). – Havaas, Lich. Norv. 515 (BG, C, O, UPS). – Havaas, Lich. Norv. occ. 109 (BG, LD, S, UPS). – Krypt. exs. Vind. 2366 (LD, O, S, UPS), 2366b (GB, LD, S, UPS), 2366c (BG, C, GB, LD, S, UPS). – Magnusson, Lich. sel. 416 (LD, S, UPS). – Malme, Lich. Suec. 582 (C, LD, S, UPS). – Räsänen & Hakulin, Lichenoth. Fenn. 482 (H, KUO, LD, OULU, TUR, UPS), 1115 (C, H, LD, OULU, TUR, UPS). – Vezda, Lich. sel. 1225 (UPS). – Stenhammar, Lich. Suec. 212b (UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. Sk, 5. – Bl, 16. – Sm, 2. – Öl, 5. – Gtl, 7. – Ög, 7. – Vg, 6. – Hl, 3. – Bh, 65. – Srm, 15. – Upl, 26. – Gstr, 6. – Hls, 2. – Mpd, 11. – **Norway.** Östf, 3. – Akh, 2. – Vestf, 7. – AuAgd, 3. – VAgd, 4. – Rog, 5. – Hrd, 11. – SoFj, 6. – MöRo, 10. – STrd, 5. – NTrd, 1. – Nrd, 3. – Trs, 6. – Fnm, 31. – **Finland.** Al, 47. – Ab, 48. – Nyl, 70. – Ka, 3. – St, 7. – Oa, 8. – **Denmark.** Jl, 1 – Brnh, 7.

Physcia semipinnata (Gmelin) Moberg comb. nov.

Fig. 26, Map 14

Lichen semipinnatus Gmelin 1792: 1372. – *Lobaria semipinnata* Hoffm. 1796: 151. Neotype (sel. here): Scotland, Perthshire, Killin, Crombie Lich. Brit. exs. n. 151 (UPS).

Lichen leptaleus Ach. 1798: 108. – *Physcia leptalea* (Ach.) DC. – Illeg. superfluous name (*Lichen semipinnatus* Gmelin).

Thallus orbicular, up to 3 cm across, sometimes confluent with other thalli and covering large areas, loosely attached to the substratum, white-grey to darkgrey sometimes white-spotted (cf. *Ph. aipolia*). Lobes mostly long and narrow (<1 mm) but sometimes shorter and broader (up to 2 mm), margins always with long cilia of the same colour as the lobe except for the darker tips. Lower side pale grey to pale brown with a few rhizinae that are slightly darker than the under-



Map 13. *Physcia tenella* var. *marina*

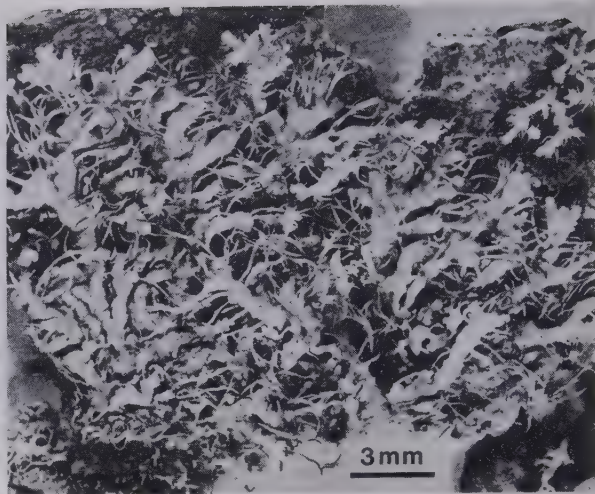
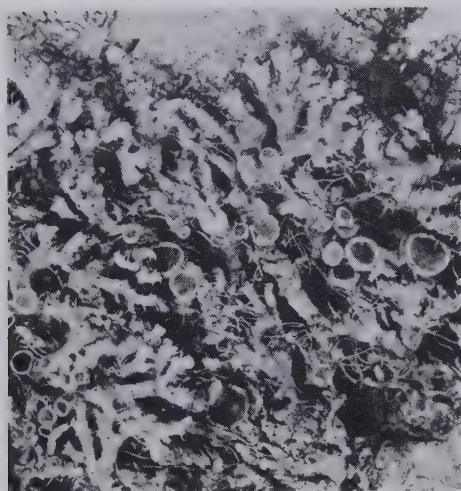


Fig. 26. *Physcia semipinnata*, Sweden, Upl, Moberg 1526b (left), 1961 Du Rietz (right, both UPS).

side and blackend at the tips. Soralia absent. Upper cortex paraplectenchymatous; lower cortex prosoplectenchymatous; algal layer sometimes irregular, developing maculation on the upper surface (cf. *Ph. aipolia* and Fig. 1B).

Apothecia common, stipitate, up to 3 mm in diameter. Spores $17-22(-24) \times 7.5-10 \mu\text{m}$.

Pycnidia more or less common, immersed; pycnoconidia $4-6 \times 1 \mu\text{m}$.

Chemistry: cortex K+ yellow. Atranorin present.

Short characterization: lobes ascending and ciliate, no soralia, apothecia abundant. Corticolous.

DISTRIBUTION AND HABITAT. The species is corticolous, growing on various deciduous trees in the southern parts of Fennoscandia (Map 14) and has a preference for costal sites.

REMARKS AND AFFINITIES. This species has up to now been called *Physcia leptalea* (Ach.) DC., but as Acharius in the description of *Lichen leptaleus* cites *Lichen semipinnatus* Gmelin as a synonym, *L. leptaleus* has to be rejected as being superfluous (Code Art. 63).

In the brief description of *Lichen semipinnatus*, Gmelin refers to Leers Flora Herb. (1789:

261, *L. hispidus*) which is not consistently binary and must not be taken into consideration (Code Art. 23 Note). Nevertheless, even if the reference is regarded as valid, it is obvious that *L. hispidus* sensu Leers is not the same as *L. hispidus* sensu Schreber (cf. *Ph. tenella*) but rather a part of it and Gmelin stressed that by exactly citing Leer's description.

Physcia semipinnata is easily separated from other ciliate species by the lack of soralia and the usually very strong ciliation. Occasionally some modifications of *Ph. stellaris* are misidentified as *Ph. semipinnata*, particularly those having pale rhizinae visible from the upper side. The absence of the characteristic marginal cilia, the more appressed thallus and the absence of white spots on the upper side separate such modifications from *Ph. semipinnata*.

EXSICCATA EXAMINED: Fries, Lich. Suec. 206B (LD, S, UPS). – Havaas, Lich. Norv. 542 (BG, C, O, UPS). – Magnusson, Lich. sel. 263 (C, Degel, GB, H, LD, S, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. Bl, 1. – Öl, 1. – Gtl, 13. – Vg, 4. – Bh, 26. – Dls, 1. – Srm, 5. – Upl, 18. – **Norway.** Vestf, 2. – Rog, 5. – Hrd, 2. – **Finland.** Al, 1. – Nyl, 1. – **Denmark.** Jl, 13. – Fyn, 2. – Sj, 2. – Brnh, 9.



Map 14. *Physcia semipinnata*

Section *Caesia* Lynge emend. Moberg

Physcia subgen. (?) *Brachysperma* sect. *Caesia* Lynge 1935: 86. – *Physcia* subgen. *Euphyscia* sect. *Brachysperma* subsect. *Caesia* (Lynge) Maas G. 1952: 225. – *Physcia* subgen. *Euphyscia* sect. *Brachysperma* subsect. *Albida* “group” *Caesia* (Lynge) Thoms. 1963: 73. – *Physcia* sect. *Brachysperma* subsect. *Albida* ser. *Caesia* (Lynge) Frey 1963: 451. – Type species (Poelt 1974: 72): *Physcia caesia* (Hoffm.) Fűrnröhr.

This section is characterized by maculated surface of the thallus, lobes without cilia, cortex and medulla K+ yellow, atranorin accompanied by zeorin.

***Physcia aipolia* (Humb.) Fűrnröhr 1839: 249.**

Fig 27, 28, 1B

Lichen aipolius Ehrh. ex Humb. 1793: 19. – Lectotype (sel. here): Germany, Hannover, Ehrh. Pl. Crypt. Linn. exs. n. 197 (BM, herb. Smith).

Lichen anthelinus Ach. 1798: 111. – *Physcia aipolia* f. *anthelina* (Ach.) Vain. 1881: 135. – Lectotype (sel. here): Sweden (H, herb. Ach. n. 1435, see Appendix Plate II).

Parmelia aipolia α *acrita* Ach. 1810: 477. – Lectotype (sel. here): Sweden (H, herb. Ach. n. 1378, see Appendix Plate I).

Parmelia aipolia β *cercida* Ach. 1810: 478. – Lectotype (sel. here): Sweden (H, herb. Ach. n. 1434, see Appendix Plate II).

Physcia stellaris var. *angustata* Nyl. 1860: 426. – *Ph. aipolia* ssp. *angustata* (Nyl.) Lynge 1916: 35. – Holotype: France, Hospice de Luchon, Nylander (H, herb. Nyl. n. 32232).

Physcia aipolia f. *alnophila* Vain. 1881: 136. – *Ph. aipolia* var. *alnophila* (Vain.) Lynge 1916: 34. – Lectotype (sel. here): Finland, Inari, Veskonieni, 1878 Vainio (TUR, herb. Vain. n. 8070).

Physcia aipolia f. *crenulata* Vain. 1881: 136. – Lectotype (sel. here): Finland, Kuusamo, 1861 Fellman (H).

Physcia aipolia f. *decolorata* Vain. 1881: 136. – Lectotype (sel. here): USSR, Karelia pomorica occ., Repola, near Tuulijärvi, Vainio (TUR, herb. Vain. n. 8079).

Physcia aipolia ssp. *angustata* f. *pruinosa* Lynge 1916: 36. – Coll. orig: Norway, Tromsö, Norman (not seen).

Physcia aipolia f. *verruculosa* Vain. in Räs. 1921: 166. – Lectotype (sel. here): Finland, Ostrobothnia austr., Lapua, Marielund, 1920 Räsänen (TUR, herb. Vain. n. 8061). Isolectotype H.

Thallus mostly orbicular in outline, up to 10 cm across, more or less closely appressed to the substratum, white-grey to dark grey usually densely white-maculated (Fig. 1 B), sometimes provided with a weak pruina. Lobes radiating, up to 3 mm broad, sometimes distinctly separated but mostly more or less overlapping. Neither soredia nor isidia present but some forms develop bullate warty lobes towards the center of older thalli. Underside white to pale brown with pale brown to brown rhizinae.

Upper cortex paraplectenchymatous, very irregular in thickness the thickest parts causing the white spots on the surface (Fig. 1B). Lower cortex prosoplectenchymatous.

Apothecia common, usually numerous and of variable size but seldom more than 3 mm across, disc often with a white pruina. Spores 16–26(–29) $\times$ 7–11 μ m.

Pycnidia common and mostly immersed in the thallus, pycnoconidia 4–6 $\times$ 1 μ m.

Chemistry: cortex and medulla K+ yellow. Atranorin and zeorin present.

Short characterization: broad-lobed, white maculated, non-sorediate. Cortex and medulla K+ yellow. Apothecia abundant. Corticolous.

DISTRIBUTION AND HABITAT. *Ph aipolia* is widely distributed in Fennoscandia but becomes less common in the northern parts. The most common substrate is trunks of *Populus tremula* but occurrences on trunks and twigs of other deciduous trees are not uncommon, especially for var. *alnophila*.

REMARKS AND AFFINITIES. The name *Lichen aipolius* dates from Ehrhart in Pl. Crypt. Linn. n. 197 but the species was first described by Humboldt. The combination into *Physcia* was made in Fűrnröhr's work (l.c.) where the lichen part has been assumed to have been written by Hampe, although in the preface there are no indications to support this assumption. Obviously Fűrnröhr had adopted the lichen system earlier suggested by Hampe but the combination has to be credited to Fűrnröhr. Consequently, the correct cita-

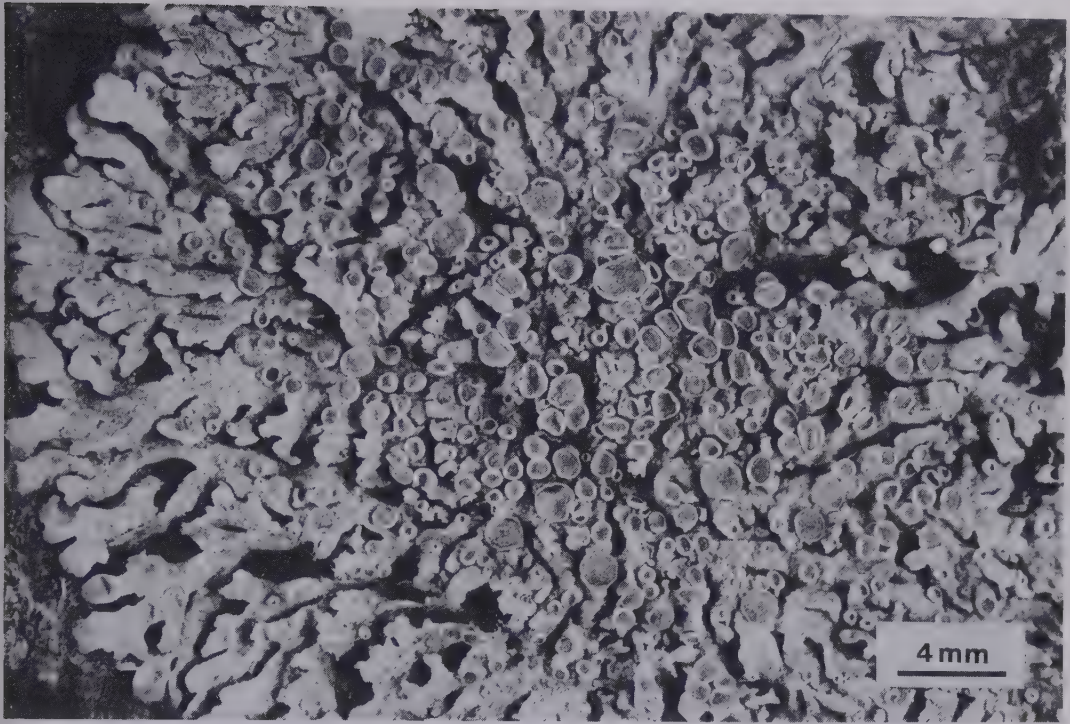


Fig. 27. *Physcia aipolia* var. *aipolia*, Norway, Opl, Moberg 1314a (UPS, herb. Mob.).

tion of the species is *Ph. aipolia* (Humb.) Fűrnrrohr.

Within this very variable species many infra-specific taxa have been distinguished, and those described on material from Fennoscandia have been examined. All but var. *alnophila* and f. *crenulata* are well accommodated within the known variation of *Ph. aipolia* var. *aipolia* and have thus been included in this variety.

Ph. aipolia is usually easily separated from other *Physcia* species by the combination of the broad, white-spotted lobes, the K+ yellow reaction of the medulla and the corticolous habitat. It usually grows together with *Ph. stellaris* which has a different medulla reaction (K-).

Ph. aipolia is subdivided into two taxa which are characterized by differences in spore size, localization and size of apothecia, and geographical distribution. The variety level is supposed to be the appropriate level.

Apothecia to the tips of the lobes, small and crowded, spores usually $<22 \mu\text{m}$ *Ph. aipolia* v. *alnophila*
Apothecia not so, spores $>22 \mu\text{m}$.

..... *Ph. aipolia* v. *aipolia*

var. *aipolia*

Fig. 27, 1B

Lichen aipolius Ehrh. ex Humb. - *Lichen anthelinus* Ach. - *Parmelia aipolia* α *acrita* Ach. - *Parmelia aipolia* β *cercida* Ach. - *Physcia stellaris* var. *angustata* Nyl. - *Physcia aipolia* ssp. *angustata* (Nyl.) Lyng. - *Physcia aipolia* f. *decolorata* Vain. - *Physcia aipolia* ssp. *angustata* f. *pruinosa* Lyng. - *Physcia aipolia* f. *verruculosa* Vain. in Räs.

Bibliography and types, see under the species.

Thallus mostly orbicular, up to 10 cm across. Lobes up to 3 mm broad. Apothecia usually numerous and variable in size, up to 3 mm across. Spores (17-)22-26(-29) $\times$ 8-11 μm .

DISTRIBUTION. Var. *aipolia* is common in south and central Fennoscandia but in northern parts it becomes rare and is there usually replaced by var. *alnophila* (see below). For the differences to var. *alnophila*, see under var. *alnophila*.

EXSICCATA EXAMINED: Fries, Lich. Suec. 207 (LD, S, UPS). – Havaas, Lich. Norv. 215 (BG, C, H, O, UPS). – Malme, Lich. Suec. 205 (C, H, LD, S, UPS). – Räsänen, Lich. Fenn. 93, 94 (BG, C, H, S, TUR, UPS), 916 (C, H, KUO, S, TUR, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 40, 41 (H, KUO, LD, MIN, OULU, S, TUR, UPS), 480, 705, 816, 910 (C, H, KUO, LD, OULU, S, TUR, UPS).

var. *alnophila* (Vain.) Lynge 1916: 34
Fig. 28, Map 15

Physcia aipolia f. *alnophila* Vain. – *Physcia aipolia* f. *crenulata* Vain.

Bibliography and types, see under the species.

Thallus orbicular, up to 4 cm in diameter with narrow lobes.

Apothecia very common, crowded and small (up to 1.5 mm) usually with convex disc provided with a white pruina. Spores 16–22(–24) $\times$ 7–10 μ m.

DISTRIBUTION AND HABITAT. Var. *alnophila* is mainly restricted to higher altitudes or the northern part of Fennoscandia where var. *aipolia* becomes rarer (Map 15). It is mostly found growing on *Alnus incana* and *Salix* spp. in contrast to *Populus* favoured by var. *aipolia*.

REMARKS AND AFFINITIES. Var. *alnophila* is separated from var. *aipolia* mainly by its smaller size, smaller and more abundant apothecia which



Fig. 28. *Physcia aipolia* var. *alnophila* (narrow-lobed) and var. *aipolia* (broad-lobed), Finland, Ob, Vitikainen 4944 (H).



Map 15. *Physcia aipolia* var. *alnophila*

occur almost to the tips of the lobes, and smaller spores. A parallel variation is reported from North America (cf. Ahti et al. 1973: 69 as *Ph. aipolia* var. *angustata*). In spite of transitional states which could be difficult to determine the present treatment is supported by observations showing the two varieties growing side by side (Fig. 28).

EXSICCATA EXAMINED: Räsänen, Lich. Fenn. 756 (H, KUO, LD, S, TUR, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 12 (C, H, KUO, LD, OULU, S, TUR, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. *Mpd*, 2. – *Hrj*, 13. – *Jmt*, 1. – *ÅsL*, 1. – *PL*, 1. – *TL*, 8. – **Norway.** *Opl*, 1. – *NTrd*, 1. – *Trs*, 1. – *Fnm*, 8. – **Finland.** *Oa*, 1. – *Tb*, 1. – *Sb*, 1. – *Kb*, 3. – *Om*, 2. – *Ob*, 9. – *Ks*, 2. – *Lk*, 4. – *Le*, 2. – *Li*, 18.

***Physcia caesia* (Hoffm.) Fűrnrrohr 1839: 250**

Fig. 48, 15, 16A

Lichen caesi Hoffm. 1784: 65. – Neotype (sel. here): Austria, Steinach, 1957 Steiner, Krypt. exs. Vind. n. 4139 (UPS).

Lichen pulchellus Wulfen in Jaquin 1788: 199 – Lectotype (sel. here): Wulfen, *Plantae rarior* carinthiacae Tab. 16. Fig. 2.

Physcia subalbinea Nyl. 1874: 306. – Holotype: Finland, Tavastia austr., Hollola, 1863 Norrlin (H, herb. Nyl. n. 32271).

(?) *Physcia tribacoides* var. *caesiella* B. de Lesd. 1906: 515. – *Physcia caesiella* (B. de Lesd). Suza 1929: 9. – Coll. orig.: France, Hérault, Roquehaute, 1906 de Crozals (not seen).

Physcia caesia f. *adscendens* Lynge 1916: 92. – Holotype: Norway, Hordaland, Finse, Sandalshögen, 1915 Lynge (O).

Physcia caesia f. *alpina* Lynge 1916: 92. – Lectotype (sel. here): Norway, Troms, Senjen, Gibostad, 1910 Lynge (O).

Physcia caesia ssp. *ventosa* Lynge 1916: 94. – *Physcia ventosa* (Lynge) Santha 1928: 504. – Lectotype (sel. here): Norway, Buskerud, Nerål, 1915 Lynge (O).

Physcia caesia ssp. *ventosa* f. *convexa* Lynge 1916: 95. – *Physcia ventosa* f. *convexa* (Lynge) Santha 1928: 504. – Lectotype (sel. here): Norway, Buskerud, Nerål, 1915 Lynge (O).

Physcia caesia ssp. *ventosa* f. *plana* Lynge 1916: 95. – *Physcia ventosa* f. *plana* (Lynge) Santha 1928: 504. –

Lectotype (sel. here): Norway, Finnmark, Skoganvarre, 1914 Lynge (O).

Physcia wainioi Räs. 1921: 166. – Holotype: Finland, Nylandia, Helsinki, 1917 Räsänen (H).

Physcia caesia var. *corticola* Kullhem ex Räs. 1931: 125. – Lectotype (sel. here): Finland, Tammela, Mustiala, 1868 Kullhem (H).

Thallus mostly orbicular in outline, up to 5 (–7) cm in diameter, often coalescent with other thalli, more or less closely appressed to the substratum, white-grey to dark grey, usually densely white maculated (Fig. 29D), sometimes with a weak pruina. Lobes radiating, convex to concave, sometimes narrow and distinctly separated, sometimes broad (up to 3 mm) and overlapping. Soralia usually terminal on short lobes, varying from capitate to lip-shaped, occasionally also laminal varying from capitate to crater-like (Fig. 5A–D). Underside brownish or whitish with brown to black simple rhizinae. Upper cortex paraplectenchymatous, very irregular in thickness (Fig. 1A) inducing the white maculation on the surface. Lower cortex prosoplectenchymatous.

Apothecia not rare, sessile, up to 1.5 mm across. Spores 17–24×7–11 µm.

Pycnidia ± common, immersed. Pycnoconidia 4–5×1 µm.

Chemistry: cortex and medulla K+ yellow. Atranorin and zeorin present.

Short characterization: broad-lobed to narrow-lobed, white maculated, sorediate, soralia capitate to lip-shaped, marginal or laminal. Cortex and medulla K+ yellow. Apothecia not common. Saxicolous, sometimes corticolous or lignicolous.

DISTRIBUTION AND HABITAT. *Ph. caesia* is common in the whole area examined but is more frequent in the mountainous regions. It is mostly found growing on rocks, but tree-trunks, lignum, tiles and mortared walls also occasionally act as substrates. The species grows on sites, varying from markedly 'nitrophilous' to extremely acid, and in the gradient of manuration on, e.g. bird-perches, the very variable appearance from

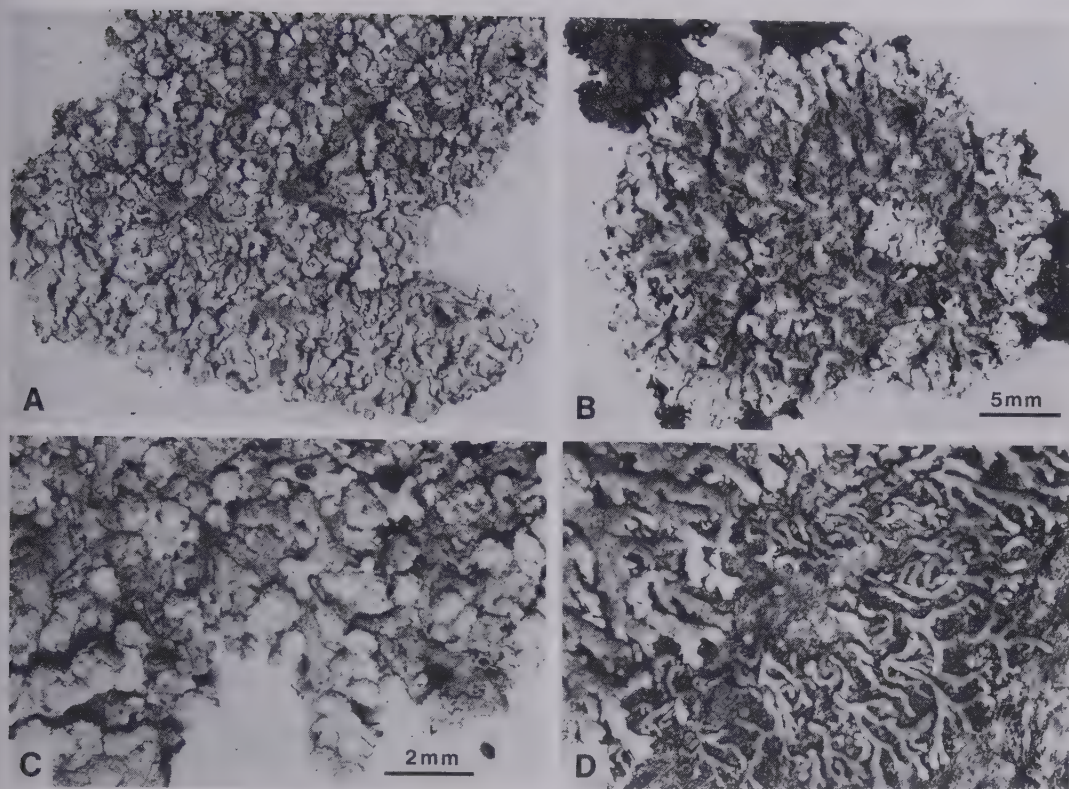


Fig. 29. *Physcia caesia*. Various modifications. A and C. Sweden, Vsm, Moberg 3033 (UPS). B. Sweden, Vsm, Moberg 3040 (UPS, "*Ph. wainioi*"). D. Sweden, TL, Moberg 852 (UPS, herb. Mob.).

thick, broad-lobed specimens to tiny narrow-lobed specimens can be studied.

REMARKS AND AFFINITIES. The combination into *Physcia* has usually been ascribed to Hampe in Fűrnrrohr (1839) but as already discussed (cf. *Physcia aipolia*) the lichen part must be attributed to Fűrnrrohr himself. Therefore, the correct citation of the species is *Physcia caesia* (Hoffm.) Fűrnrrohr.

No authentic material on which the description was based has been localized and because the figure in *Enumeratio Lichenum* is not sufficient to serve as the type a neotype has been selected. The material used (see above) agrees very well with both the original description and the figure in *Enum. Lich.*

Probably, because of the considerable variation inherent in *Ph. caesia*, several taxa have been described on material from Fennoscandia, which in the present work are treated as modifications only. Those earlier given specific rank will be discussed.

Physcia ventosa was separated from *Ph. caesia* by the darker grey colour and narrower lobes. The type material agrees very well with the modification of *Ph. caesia* which is common at higher altitudes in the Scandinavian mountains and *Ph. ventosa* is therefore included in *Ph. caesia*. Other species, e.g. *Physcia dubia*, behave in the same way.

Physcia wainioi was primarily compared with *Physcia aipolia* and separated from that species because of the presence of soralia. Later authors

(e.g. Dahl 1938) believed it to be closely related to *Physcia caesia*, from which it was separated by the type of soralia; lip-shaped in *Ph. wainioi* and capitate in *Ph. caesia*. In the present investigation the soralia have been examined with respect to development and location, and it has been found that the formation of the soralia is induced either at the end of lobes or laminally on the thallus in both cases. In the development to capitate soralia the soredia seem to remain adhered to the soralia for a long time, thus eventually forming a globular protuberances. On the other hand, in the case of lip-shaped and crateriform soralia (*Ph. wainioi*) the soredia seem to disappear rapidly, leaving a characteristic lip-shaped or crateriform structure (Fig. 15A, B and 29B). It is assumed that the soralia-type formed is the result of the action of external factors (e.g. moisture and wind) because the lip-shaped soralia predominate in exposed sites (e.g. sea and lake shores) while the capitate or intermediate types predominate in less exposed or sheltered localities. Experimentally the dispersal of soredia has been studied by e.g. Bailey (1966). His observations that the ease of dispersal of soredia by wind is influenced by their moisture content support the above suggested reasons for the various soralia-types formed.

The differences in the type of soralia between *Ph. caesia* and *Ph. wainioi* is therefore only apparent and as no other differences have been observed, the *Ph. wainioi* morphotype is consid-

ered to fall within the variation of *Ph. caesia*. The type material of *Physcia subalbinea* also possesses lip-shaped soralia and has in all other respects the same characters as the type of *Ph. wainioi*. Actually, *Ph. subalbinea* antedates *Ph. wainioi*, although from the discussion above both taxa are included in *Ph. caesia*.

The most closely related species is apparently *Physcia aipolia*, in spite of the lack of soralia and the presence of abundant apothecia. Usually the two species are easily separated by these characters, but when *Ph. caesia* is growing on trunks and has few soralia it may sometimes be difficult to separate it from sparsely fertile *Ph. aipolia* (cf. chapter Primary-secondary species).

EXSICCATA EXAMINED: Fries, Lich. Suec. 323 (S, UPS). – Havaas, Lich. Norv. 516, 517, 612 (BG, UPS). – Havaas, Lich. Norv. occ. 96 (BG, UPS). – Magnusson, Lich. sel. 313 (S, UPS). – Malme, Lich. Suec. 353 (S, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 547, 549 (UPS). – Räsänen, Lich. Fenn. 602 (KUO, TUR, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 42, 182 (KUO, MIN, OULU, TUR, UPS), 818 (KUO, OULU), 1142 (OULU, UPS). – Stenhammar, Lich. Suec. 212a (UPS).

***Physcia phaea* (Tuck.) Thoms. 1963: 54**
Fig. 30, Map 16

Parmelia phaea Tuck. in Darlington 1853: 440. – Holotype: USA, Pennsylvania, Chester, 1852 Michener (FH, herb. Tuck. n. 840).

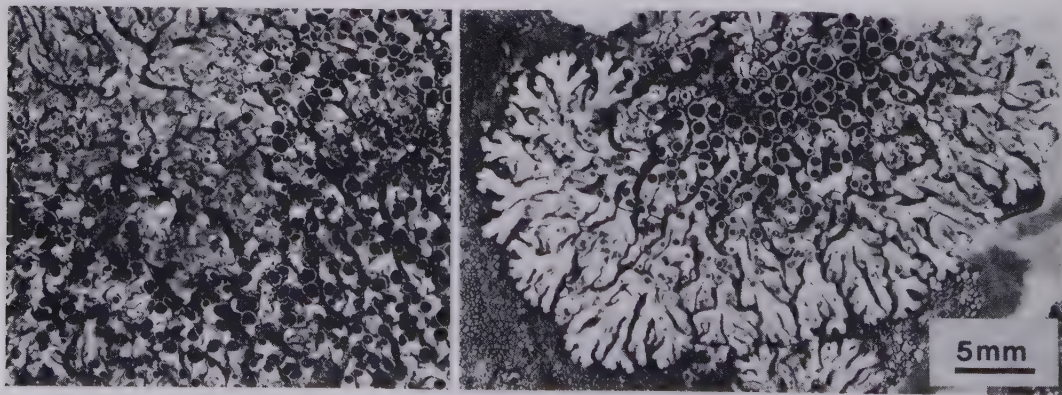


Fig. 30. *Physcia phaea*, Norway, Opl, Moberg 1268 (right), 1307 (left, both UPS, herb. Mob.).



Map 16. *Physcia phaea*

Physcia melops Duf. ex Nyl. 1874: 16. – Lectotype (sel. here): The Pyrenees, Dufour (H, herb. Nyl. n. 32276).

Thallus orbicular or irregular often coalescent with other thalli, usually closely appressed to the substratum. Upper side light grey to very dark grey mostly whitish maculated (Fig. 1B). Lobes convex, radiating, up to 2 mm broad but usually about 1 mm, mostly distinctly separated. Soralia absent. Underside pale brown to brown with rhizinae of the same colour or darker. Upper cortex paraplectenchymatous, very irregular in thickness causing the spots on the upper surface (cf. *Ph. aipolia*); lower cortex prosoplectenchymatous.

Apothecia usually very abundant, up to 2 mm across but mostly about 1 mm. Spores 15–21×7–10 µm.

Pycnidia ± immersed; pycnoconidia 4–6×1 µm.

Chemistry: cortex and medulla K+ yellow. Atranorin and zeorin present.

Short characterization: lobes convex, white maculated, non-sorediate. Cortex and medulla K+ yellow. Apothecia abundant, small. Saxicolous. Rare.

DISTRIBUTION AND HABITAT. *Ph. phaea* is a rare species in Fennoscandia (Map 16) and has been collected from only a few localities at sea-level altitude to about 1,000 m. Acid rocks sometimes weakly manured by birds (ornithocoprophilous) are the most common substrates.

REMARKS AND AFFINITIES. This species was earlier called *Ph. melops* both in European and North American literature but in 1963 Thomson correctly treated that name as a synonym of *Ph. phaea*.

Ph. phaea is separated from the closely related *Ph. caesia* by the absence of soralia and the smaller spores, and from *Ph. aipolia*, which exceptionally grows on rocks, by the smaller spores and smaller apothecia.

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EXSICCATA EXAMINED: Magnusson, Lich. sel. 200 (C, H, LD, S, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 548 (H, LD, O, UPS). – Räsänen, Lich. Fenn. 98 (BG, C, H, TUR, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. Ög, Hästholmen, 13; Ödeshög, 3. – Vg, Undenäs, 5. – Jmt, Åre, 1. – ÅsL, Dorotea, 1. – **Norway.** Akh, Oslo 10. – Opl, Dovre, 3; Lom, 5; Lesja, 1; Sel, 1; Sör-Fron, 1; Vågå, 16. – STrd, Opdal, 17; Trondheim, 1. – **Finland.** Ob, Kemi, 1.

Section *Fusisporae* sect. nov.

Sporae anguste ellipsoideae, pariete ornamentis manifeste instructo.

Type species: *Physcia magnussonii* Frey

This section is characterized by the narrowly ellipsoid spores with a distinct ornamentation on the surface (Fig. 11E). The type species is so far its only representative.

Physcia magnussonii Frey 1952: 480

Fig. 31, Map 17

Lectotype (sel. here): Switzerland, Graubünden, Münstertal, Rhatien, Umbrailpass, 1960 m, 1927 Frey 164 (BERN, herb. Frey n. 2306). Isolectotype UPS.

Parmelia stellaris var. *pseudoincisa* Th.Fr. 1856: 125. – *Physcia stellaris* α *adpressa* β *aipolia* δ *subincisa* Th. Fr. 1871: 140. – *Physcia aipolia* var. *subincisa* (Th.Fr.) Lyngb 1916: 35. – Lectotype (sel. here): Sweden, Östergötland, Söderköping, Ramunderberget, Stenhammar. Fries Lich. Suec. exs. n. 340 (UPS). Isolectotypes LD, S.

Thallus usually orbicular in outline, up to 8 cm across, sometimes confluent with other thalli, ± loosely appressed to the substratum. Upper side greyish, sometimes with a brownish tinge, mostly with a dense whitish pruina. Lobes radiating, up to 3 mm broad, often overlapping. Soralia absent. Underside whitish with a pinkish tinge or brownish, with simple rhizinae of the same colour. Upper cortex paraplectenchymatous; lower cortex prosoplectenchymatous.

Apothecia common, usually crowded, up to 3 mm across, disc mostly with a white pruina.

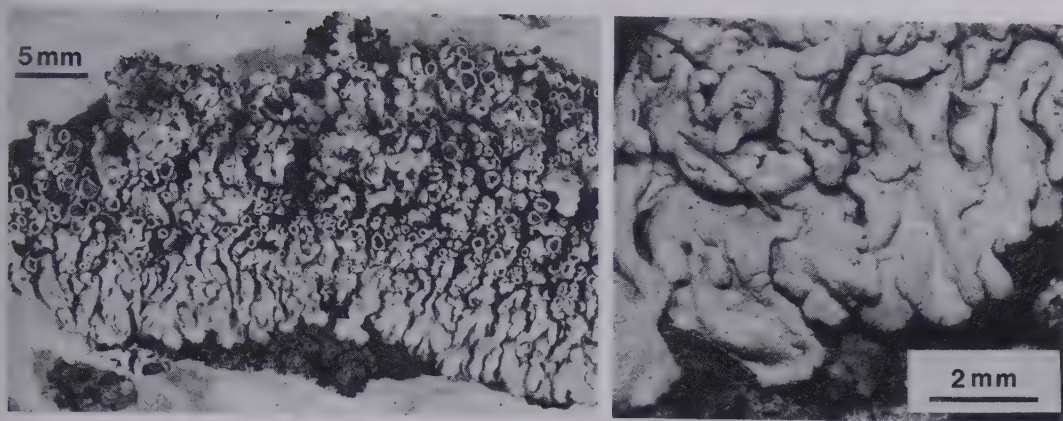


Fig. 31. *Physcia magnussonii*, Norway, Opl, Moberg 1231 (UPS, herb. Mob.).

Spores narrowly ellipsoid with a distinct ornamentation on the surface (Fig. 27), $16\text{--}24 \times 6\text{--}9\text{ }\mu\text{m}$.

Pycnidia $\pm$ immersed, pycnoconidia $4\text{--}6\text{--}(7) \times 1\text{ }\mu\text{m}$.

Chemistry: cortex K+ yellow, medulla more or less rose coloured with K. Atranorin present.

Short characterization: densely pruinose, broad-lobed, thallus without soralia. Apothecia abundant with distinct ornamentated spores. Epilithic. Rare.

DISTRIBUTION AND HABITAT. The species is exclusively epilithic in Fennoscandia and seems to prefer acidic rocks, but there is no such strong affinity to sites manured by birds as reported from Central Europe by Frey (1963). The records indicate a preference of higher temperature rather than high moisture, e.g. steep southerly exposed rocky slopes. Map 17.

REMARKS AND AFFINITIES. Until the treatment by Sernander-Du Rietz (1969) this species was not known from Fennoscandia, but stimulated by her paper several new localities have been reported (Jørgensen & Övstedal 1975: 14 and Flatberg & al. 1975: 240). On Map 17 the known distribution is summarized including some previously overlooked localities and excluding the earlier published locality from the province of Gotland

(Sernander-Du Rietz l.c.). This material is probably *Ph. caesia*. One of the interesting records from Uppland, Sweden (close to Uppsala), discovered by Sernander-Du Rietz among herbarium material, has in spite of close examination not been refound in the field.

In connection with the description of *Parmelia stellaris* var. *pseudoincisa* Th.M. Fries (1856: 125) cites *Parmelia incisa* Stenhammar as a synonym. However, Stenhammar (1843: 614) did not describe any new species but cites a locality for *Parmelia incisa* Fries (1825: 284). Later Th.M. Fries changed the name *pseudoincisa* to *subincisa* (1871: 140) a name which Lynge (1916: 35) treated as a variety of *Physcia aipolia*.

The type material of *Parmelia incisa* Fries in UPS is not a *Physcia* species but filed under *Lecanora pruinosa* Chaub.

Ph. magnussonii is easily separated from other *Physcia*-species studied by the esorediate, broad-lobed and densely pruinose thallus and the weakly K+ rose coloured medulla (no substance identified). Microscopically the distinctly ornamentated spores are easily recognized and separated from other types (Fig. 11D, E).

EXSICCATA EXAMINED: Fries, Lich. Suec. 340 (LD, S, UPS).

SPECIMENS EXAMINED (additional localities see Sernander-Du Rietz 1969 and Flatberg et al. 1975): **Sweden.** Upl, Torsvi, Koholmen, Ytterholmen 1976 Mo-



Map 17. *Physcia magnussonii*

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berg 3449 (UPS, herb. Mob.). – *Dlr*, Idre, Häggsundet, Vålåberget, 1961 Hasselrot (S). – **Norway**. *Opl*, Vågå, Sjudalen, Kampen, 1952 Ahlner (S); Vågåmo, 1948 Ahlner (S); 1971 Moberg 1619 (UPS, herb. Mob.); Lye, 1969 Moberg 1242 (UPS, herb. Mob.). – *SoFj*, Aurland, Vasslibygdi, 1972 Övstedal (BG). – *MöRo*, Nordal, Sylte, 1947 Magnusson 20503a (UPS). – *STrd*, Hemne, Kyrksaeterfjell, 1932 Breim (O).

Section *Stellares* Lynge emend. Moberg

Phycia subgen. (?) *Brachysperma* sect. *Stellaris* Lynge 1935: 65. – *Phycia* subgen. *Euphyscia* sect. *Brachysperma* subsect. *Stellaris* (Lynge) Maas G. 1952: 218. – *Phycia* subgen. *Euphyscia* sect. *Brachysperma* subsect. *Albida* "group" *Stellaris* (Lynge) Thoms. 1963: 41. – *Phycia* sect. *Brachysperma* subsect. *Albida* ser. *Stellaris* (Lynge) Frey 1963: 419. – Type species (Poelt 1974: 86): *Phycia stellaris* (L.) Nyl.

Phycia subgen. (?) *Brachysperma* sect. *Tribacia* Lynge 1935: 110. – *Phycia* subgen. *Brachysperma* sect. "*Dubia*" Nädv. 1947: 86 (lapsus calami?) – *Phycia* subgen. *Euphyscia* sect. *Brachysperma* subsect. *Tribacia* (Lynge) Maas G. 1952: 241. – *Phycia* subgen. *Euphyscia* sect. *Brachysperma* subsect. *Albida* "group" *Tribacia* (Lynge) Thoms. 1963: 81. – *Phycia* sect. *Brachysperma* subsect. *Albida* ser. *Tribacia* (Lynge) Frey 1963: 440. – Type species (sel. here): *Phycia dubia* (Hoffm.) Lett.

This section is characterized by the lack of marginal cilia, the absence of a distinct maculation on the surface (see sect. *Caesia*), and the K-negative medulla.

Phycia stellaris (L.) Nyl. 1856b: 307

Fig. 32, 3, Map 18

Lichen stellaris L. 1753: 1144. – Type in LINN. Seen only on microfiche.

Parmelia stellaris α *radiata* Ach. 1810: 477. – *Phycia stellaris* α *radiata* (Ach.) Nyl. 1861: 111. – Lectotype (sel. here): Sweden, (H, herb. Ach. n. 1436, see Appendix Plate II).

Parmelia stellaris β *rosulata* Ach. 1810: 477. – *Phycia stellaris* β *rosulata* (Ach.) Nyl. 1861: 111. – Lectotype (sel. here): Sweden (H, herb. Ach. n. 1436, see Appendix Plate II).

Phycia stellaris var. *tenera* Havaas ex Lynge 1916: 28. – Lectotype (sel. here): Norway, Hordaland,

Granvin, Åsene, 1901 Havaas, Lich. Norv. exs. n. 425 (BG). Isotypes O, UPS.

Phycia stellaris var. *angustiloba* Räs. 1921: 165. – Lectotype (sel. here): Finland, Ostrobothnia bor., Simo, Penttilä, 1915 Räsänen (H).

Thallus orbicular, up to 5 cm across, sometimes confluent with other thalli, more or less closely appressed to the substrate, white grey to darker grey with a very weak yellowish tinge. Lobes radiating, very variable in width (up to 3 mm) usually distinctly separated but sometimes overlapping. Neither soredia nor isidia present but occasionally bullate, warty lobes develop towards the centre of older thalli (cf. *Ph. aipolia*). Underside white to pale brown, with rhizinae of the same colour or darker that sometimes project beyond the margins of the lobes. Upper cortex paraplectenchymatous; lower cortex prosoplectenchymatous.

Apothecia usually numerous, sessile or mostly short-stalked, very variable in size (up to 4 mm in diameter); disc sometimes with a white pruin. Spores 16–22×7–10 μ m.

Pycnidia common, mostly immersed; pycniconidia 4–6×1 μ m.

Chemistry: cortex K+ yellow. Atranorin present.

Short characterization: narrow-lobed to broad-lobed, grey with a very weak yellowish tinge. Medulla K–. Apothecia abundant. Corticolous.

DISTRIBUTION AND HABITAT. *Ph. stellaris* is predominantly a corticolous species growing on trunks and branches of various deciduous trees, perhaps with some preference for *Populus tremula*. It is common in the northern part of Fennoscandia but decreases in abundance towards the south and becomes rare in the southernmost part. This is hardly seen on Map 18 as the northern parts are rather poorly recorded.

REMARKS AND AFFINITIES. The type material of the cited subspecific names are, except for var. *angustiloba*, well accommodated within the known variation of the species. Var. *angustiloba*, which is known only from the type locality, is separated mainly because of the narrow con-

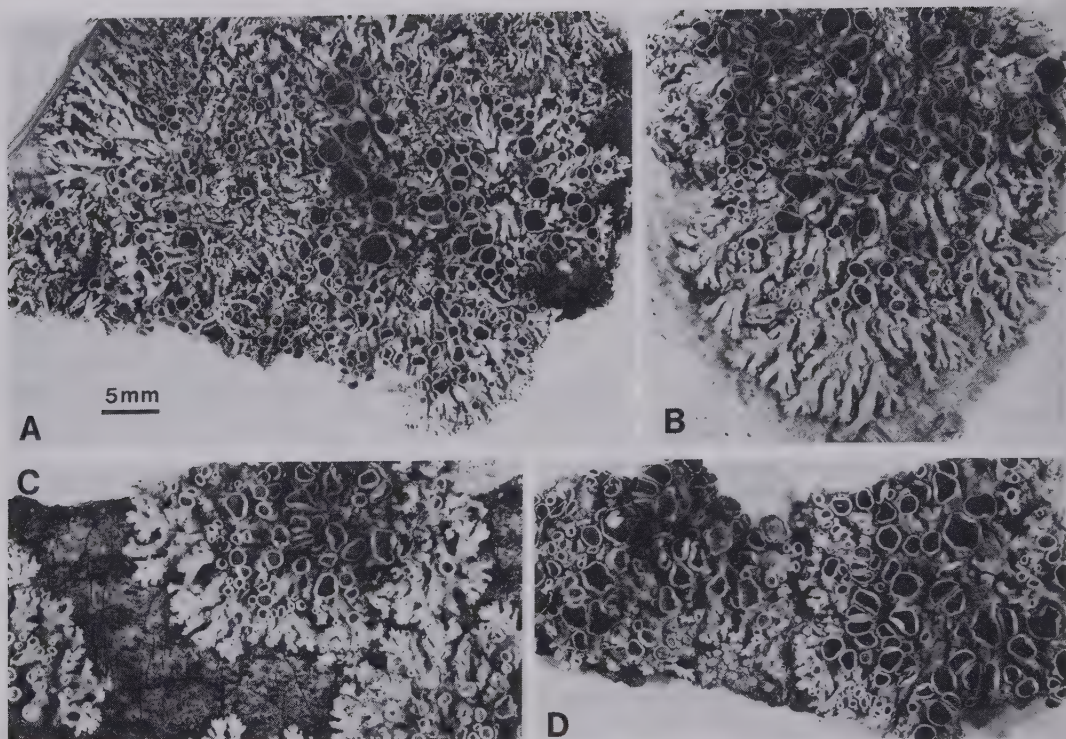


Fig. 32. *Physcia stellaris*. Various modifications. A and B. Sweden, TL, Moberg 802 (UPS). C and D. Sweden, Ång, Moberg 2009, 29 (UPS, herb. Mob.).

vex lobes and the different habitat (on a stone in a field). It is considered here that the unusual site has induced the different appearance and that the variety is merely an extreme modification.

As discussed in connection with *Ph. semipinnata*, some modifications of *Ph. stellaris* with narrow lobes and rhizinae projecting beyond the margins (Fig. 3) may be misidentified as *Ph. semipinnata*. However, a more appressed thallus, the lack of true marginal cilia and the absence of white spots on the upper side separate such forms from *Ph. semipinnata*. The lack of white spots on the upper side is also one of the main qualities which separates *Ph. stellaris* from *Ph. aipolia*. Certainly on some occasions *Ph. stellaris* may have a weak maculation on the upper side (shade form), but in such cases the K-test on the medulla easily separates the material.

Although *Ph. stellaris* is considered to be closely related to *Ph. aipolia* (Lynge 1935: 66) the chemistry, the shape of lobes and apothecia indicate closer affinities to other species, such as *Ph. dubia*.

EXSICCATA EXAMINED: Fries, Lich. Suec. 206A (LD, S, UPS). – Havaas, Lich. Norv. 425 (BG, C, O, UPS). – Malme, Lich. Suec. 631, 685 (C, LD, S, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 215 (C, H, LD, UPS). – Räsänen, Lich. Fenn. 90, 91 (BG, C, H, S, TUR, UPS), 757, 915 (C, H, KUO, LD, S, TUR, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 39, 181 (H, KUO, LD, MIN, OULU, S, TUR, UPS), 479, 561, 706, 707 (C, H, KUO, LD, OULU, S, TUR, UPS), 817, 986 (C, H, KUO, LD, OULU, TUR, UPS). – Stenhammar, Lich. Suec. 73 (UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. Sk, 14. – Bl, 3. – Sm, 15. – Öl, 4. – Gtl, 3. – Ög, 11. – Vg, 37. – Hl, 5. – Bh, 20. – Dls, 4. – Vrm, 6. – Nrk,



Map 18. *Physcia stellaris*

14. - *Srm*, 49. - *Upl*, 49. - *Vsm*, 18. - *Dlr*, 23. - *Gstr*, 2. - *Hls*, 17. - *Mpd*, 18. - *Ång*, 11. - *Hrj*, 17. - *Jmt*, 23. - *Vb*, 9. - *Nb*, 11. - *ÅsL*, 10. - *LyL*, 4. - *TL*, 7. - **Norway**. *Östf*, 4. - *Akh*, 46. - *Hdm*, 6. - *Opl*, 49. - *Busk*, 7. - *Vestf*, 10. - *Tel*, 7. - *AuAgd*, 2. - *VAgd*, 1. - *Rog*, 12. - *Hrd*, 21. - *SoFj*, 12. - *MöRo*, 16. - *STrd*, 14. - *NTrd*, 3. - *Nrd*, 7. - *Trs*, 34. - *Fnm*, 10. - **Finland**. *Al*, 15. - *Ab*, 35. - *Nyl*, 162. - *Ka*, 5. - *St*, 20. - *Ta*, 48. - *Sa*, 30. - *Oa*, 35. - *Tb*, 33. - *Sb*, 61. - *Kb*, 21. - *Om*, 22. - *Ok*, 8. - *Ob*, 62. - *Ks*, 7. - *Lk*, 6. - *Le*, 2. - *Li*, 7. - **Denmark**. *Jl*, 21. - *Fyn*, 3. - *Loll*, 1. - *Sj*, 32. - *Brnh*, 19.

***Physcia dimidiata* (Arn.) Nyl. 1881: 537**

Parmelia pulverulenta var. *dimidiata* Arn. 1864: 594.

Var. *ornata* (Nádv.) Moberg comb. nov.
Fig. 33, Map 19

Physcia dimidiata f. *ornata* Nádv. 1947: 89.

Bibliography and types see Moberg 1971: 134.

Only var. *ornata* is present in Fennoscandia why only this variety will be treated.

Thallus orbicular or mostly irregular in outline, up to 5 cm across, usually loosely attached to the substrate, grey to bluish grey or dark grey,

provided with a dense whitish pruina. Lobes radiating, up to 3 mm broad, and with crenate tips. Soralia marginal, usually with granular soredia, becoming laminal and covering the central parts of the thallus. Underside white to brownish with white to brown rhizinae. Upper cortex paraplectenchymatous; lower cortex proso-plectenchymatous.

Apothecia and pycnidia not seen.

Chemistry: cortex K+ yellow. Atranorin present.

Short characterization: lobes densely pruinose. Soralia marginal to laminal, soredia granular. Epilithic. Rare.

This taxon has previously been treated by the present author (Moberg 1971) and only the additional localities will be discussed here.

Jørgensen & Övstedal (1975: 14) and Flatberg & al. (1975: 240) reported the species from some new localities north of those previously known. The collected material has been examined and all except two collections (= *Ph. dubia*) are considered to belong to this taxon (cf. specimens examined.). It is interesting to note that the sites differ from the earlier ones known in Fennoscandia in being less typically continental.

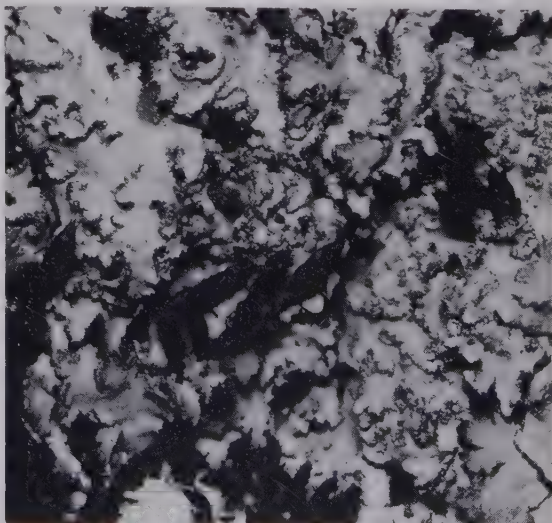
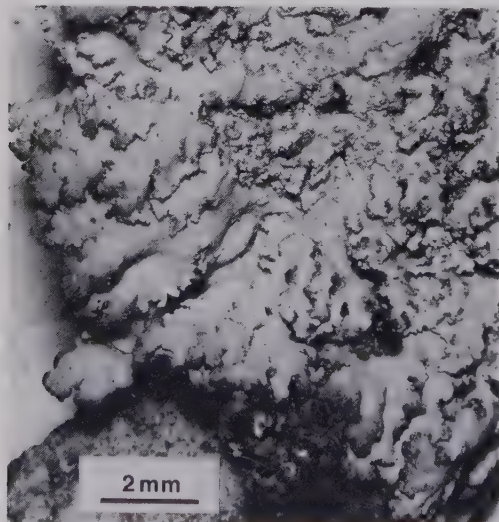


Fig. 33. *Physcia dimidiata* var. *ornata*, Norway, Opl, Moberg 1297 (right), 1298 (left, both UPS, herb. Mob.).



Map 19. *Physcia dimidiata* var. *ornata*

Symb. Bot. Upsal. XXII:1

SPECIMENS EXAMINED (additional localities, see Moberg 1971 and Flatberg et al. 1975): Norway, *Opl*, Vågå, Jönndalen, close to Öjaseter, 1971 Moberg 1627 b (UPS, herb. Mob.). – *SoFj*, Aurland, 1 km W of Nesbø, 1967 Övstedal (BG).

***Physcia dubia* (Hoffm.) Lett. 1912: 254**

Fig. 34, 5E, F

Lobaria dubia Hoffm. 1796: 156. – Neotype (sel. here): Germany, Ehingen, 1897 Rieber, Arnold, Lich. exs. n. 1724 (UPS).

Parmelia caesia β *teretiuscula* Ach. 1810: 479. – *Physcia teretiuscula* (Ach.) Lynge 1916: 96. – Lectotype (sel. here): Sweden (H, herb. Ach. n. 1439, see Appendix Plate II. Isolectotype UPS).

Physcia stellaris **caesitia* Nyl. in Norrl. 1873: 326. – *Physcia caesitia* (Nyl.) Nyl. 1887: 222. – Lectotype (Wade 1960: 141): Finland, Lapponia enontekiensis, Kilpisjärvi, Pietsovaara, 1867 Norrlin (H, herb. Nyl. 32148). Isolectotype H.

Physcia intermedia Vain. 1878: 51. – Lectotype (sel. here): Finland, Karelia austr., Viborg, 1875 Vainio (Lang) (TUR, herb. Vain. n. 8225).

Physcia stellaris **tribacia* f. *tenuissima* Vain. 1881: 135. – Lectotype (sel. here): USSR, Karelia pomorica occ., Repola, Koroppi, 1875 Vainio (TUR, herb. Vain. 8237). Syntype: Finland, Lapp. inarensis, Ruoptu-invaara, 1878 Vainio (TUR, herb. Vain. n. 8211).

Physcia wahlenbergii Lynge 1913: 7. – *Physcia intermedia* var. *wahlenbergii* (Lynge) Lynge 1916: 99. – Coll. orig.: Norway, Tromsø, 1910 Lynge (O, not seen).

Physcia stellaris f. *tenuisecta* Th. Fr. ex Lynge 1916: 27. – Holotype: Norway, Oppland, Gudbrandsdalen, 1863 Th. M. Fries (UPS).

Physcia intermedia var. *stellata* Lynge 1916: 98. – Lectotype (sel. here): Norway, Finnmark, Varanger, Pasvikelven, 1857 Th. M. Fries (UPS).

Physcia sciastra var. *salina* Erichs. in Lynge 1935: 142. – Holotype: Germany, Insel Neuwerk, Südküste, 1929 Erichsen (HBG).

Physcia lyngei Nadv. 1948: 146. – Holotype: Norway, Dovre, Vaarstien, 1925 Lynge (PRM, herb. Servit n. 10.390).

Thallus irregular or orbicular in outline, up to 5 cm across, often confluent with other thalli, more or less closely appressed to the substrate. Upper side white-grey to dark grey, usually more or less glossy, occasionally provided with a weak pruina. Lobes radiating, up to 2 mm broad, sometimes elongated, narrow and distinctly separated with reflexed tips, or sometimes short, broad and ascending. Soralia mostly marginal and lip-shaped, sometimes laminal and crateriform. Underside white to brownish, with white to brown or sometimes black rhizinae. Upper cortex paraplectenchymatous; lower cortex prosoplectenchymatous.

Apothecia not common, up to 2 mm across, usually with sorediate margins. Spores 16–24(–28) $\times$ 6–10 μ m.

Pycnidia sparse, mostly immersed in the thallus. Pycnoconidia 4–6 $\times$ 1 μ m.

Chemistry: cortex K+ yellow, medulla K–. Atranorin present.

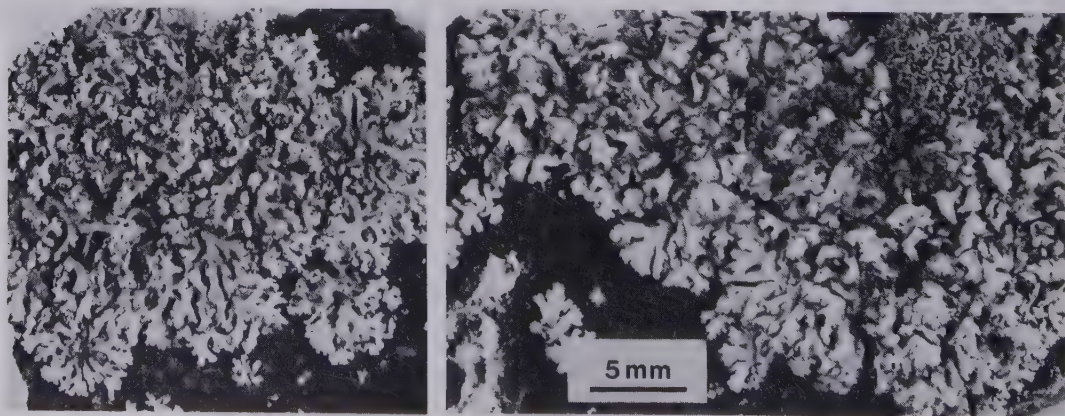


Fig. 34. *Physcia dubia*, Sweden, Upl, Moberg 1114 (left), TL, Moberg 700 (right, both UPS, herb. Mob.).

Short characterization: lobes narrow to broad. Soralia marginal and lip-shaped, rarely laminal. Medulla K—. Polymorphic species on various substrates.

DISTRIBUTION AND HABITAT. *Ph. dubia* is the most common species of *Physcia* in all parts of Fennoscandia. It is mainly epilithic growing on various types of rocks but is also frequently found growing on tree-trunks, lignum and tiles. Along with *Ph. caesia* it is characteristic of boulders manured by birds.

REMARKS AND AFFINITIES. *Ph. dubia* is a very variable species and some previously accepted specific and infraspecific taxa are reduced to synonyms. For instance, the usually accepted species *Ph. intermedia* and *Ph. teretiuscula* are regarded as modifications only.

Ph. intermedia was separated from *Ph. dubia* mainly because of the presence of laminal soralia, the smaller size and, more recently also by the smaller spores. According to Lynge (1935: 121), the length of the spores does not exceed 22 μm , but, both in the description and in the examined type material the spores are found to have a maximum length of 28 μm , the same as the maximum spore-length of typical *Ph. dubia*. Concerning the laminal soralia, they do not seem to be true soralia but rather holes left by disappeared pycnidia or apothecia, and on the whole the type material does not give the impression of being a well developed specimen. In the study of *Ph. dubia* in the Scandinavian mountains a very wide variation has been observed and modifications very close to the type of *Ph. intermedia* have been found growing in extremely exposed sites. Similarly, all kinds of intermediates have frequently been found. Consequently *Ph. intermedia* can only be regarded as an extreme modification of *Ph. dubia*.

Ph. teretiuscula was separated from *Ph. dubia* by the narrow convex lobes, the terminal, recurved, lip-shaped soralia and the K+ yellow medulla reaction. The type material has been examined with respect to the K-reaction of the medulla but no typical yellow colour has been

observed. This is also the case for other material identified as *Ph. teretiuscula*. Concerning the narrow convex lobes and the terminal, recurved, lip-shaped soralia no taxonomic significance can be given to these characters because within *Ph. dubia* transitional types are frequent. *Ph. teretiuscula* is, therefore, included as a synonym of *Ph. dubia*.

Ph. wahlenbergii, which in the description compared with and separated from *Physcia caesia* by the negative reaction of the medulla, was reduced to a variety of *Ph. intermedia* by Lynge himself. The type material has not been localized but from other material collected from the same area there is no objection to include *Ph. wahlenbergii* in variation of *Ph. dubia*.

Ph. lyngei was described on material named as *Ph. melops* by Lynge but, as pointed out by Nádvořník (l.c.) the type material is K-negative in the medulla. This K-reaction indicates a close relationship to *Ph. dubia* and because the general appearance, except for the lack of soralia, very closely coincides with *Ph. dubia*, *Ph. lyngei* is reduced to a synonym.

EXSICCATA EXAMINED: Havaas, Lich. Norv. 518, 540 (BG, UPS). ~ Havaas, Lich. Norv. occ. 110 (BG, S, UPS). – Krypt. exs. Vind. 2290, 2469 (BG, UPS). – Magnusson, Lich. sel. 25, 264 (LD, S, UPS), 265, 414 (S, UPS). – Räsänen, Lich. Fenn. 242, 439 (BG, KUO, TUR, UPS), 917 (KUO, TUR, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 818 (UPS).

Physciopsis Choisy 1950: 20

Physcia sect. *Euphyscia* b. *Sordulenta* 2. *Macrosperma* Vain. 1890: 147. – *Physcia* sect. *Sordulenta* subsect. *Macrosperma* (Vain.) Du Rietz 1925b: 82. – *Physcia* subgen. *Macrosperma* (Vain.) Lynge 1935: 181. – *Physcia* subgen. *Euphyscia* sect. *Macrosperma* (Vain.) Måas G. 1952: 277. – Type species (Choisy 1950: 20): *Physciopsis adglutinata* (Flk.) Choisy.

Thallus foliose, lobate, closely adnate, brownish and usually very small (up to 2 cm in diameter). Underside brownish, in central parts hardly detectable owing to the close attachment to the substrate, with very few "rhizinae" (Fig. 2E).

Symb. Bot. Upsal. XXII:1

Upper cortex paraplectenchymatous; algae of Trebouxia-type; medulla of loosely interwoven hyphae; lower cortex when present prosoplectenchymatous.

Apothecia lecanorine, laminal and sessile, disc brown to black. Hymenium hyaline, hypothecium colourless. Asci cylindrical, 8-spored with brown, 1-septate (to 3-septate?) spores. Paraphyses $\pm$ branched, thickened and brown towards the apices.

Pycnidia immersed, pycnoconidia filiform, more than 10 μm long.

No lichen substances found.

The main concept of the genus is based on the type of the pycnoconidia, the small size and the appressed growth. Whether or not species with 4-celled spores should be included is a matter for further study (cf. Poelt 1974).

In the area examined only one species is known.

Physciopsis adglutinata (Flk.) Choisy 1950: 20

Fig. 35, 4, Map 20

Lecanora adglutinata Flk. 1819: 7. – *Physcia adglutinata* (Flk.) Nyl. 1862: 355. – Original material "Jena und Berlin" lost. Neotype (sel. here): Germany, Baden Mosbach, 1928 Degelius (UPS).

Lecanora lepraeformis Flk. 1819: 7. – *Physcia adglutinata* var. *lepraeformis* (Flk.) Zahlbr. 1931: 587. –

Lectotype (sel. here): Germany, Berlin, Floerke, Deutsche Lich. n. 68 (UPS).

Physcia elaeina auct. (non *Parmelia elaeina* Wahlenberg in Ach. = *Vestergrenopsis e.*). See below.

Thallus mostly orbicular in outline, up to 2 cm in diameter, thin and very closely appressed to the substrate. Colour brownish-grey, grey-brown to dark brown usually darker along the lobemargins. Lobes narrow, up to 0.5 mm broad, sometimes distinctly separated, sometimes overlapping. Soralia predominantly laminal, small and spot-like (Fig. 4), usually abundant towards the centre. Underside hardly visible due to the lobes being firmly appressed to the substrate. Rhizinae short, very sparse and usually not distinctly delimited (Fig. 2E).

Upper cortex paraplectenchymatous; lower cortex prosoplectenchymatous, sometimes indistinct because of the appressed thallus.

Apothecia rare, not seen on Scandinavian material, up to 1 mm in diameter, spores 13–18 $\times$ 7–10 μm .

Pycnidia immersed, pycnoconidia (10–)15–20 $\times$ 1 μm .

Chemistry: no lichen substances found.

Short characterization: thallus small and closely appressed, brownish, sorediate. Pycnoconidia filiform. Rare.

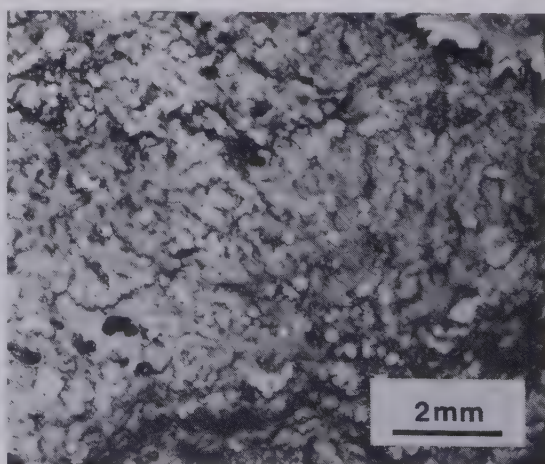
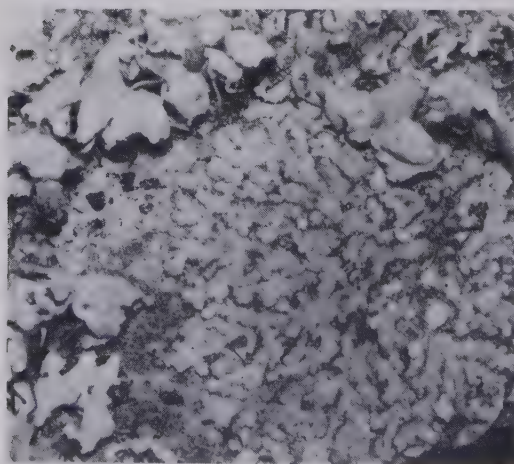
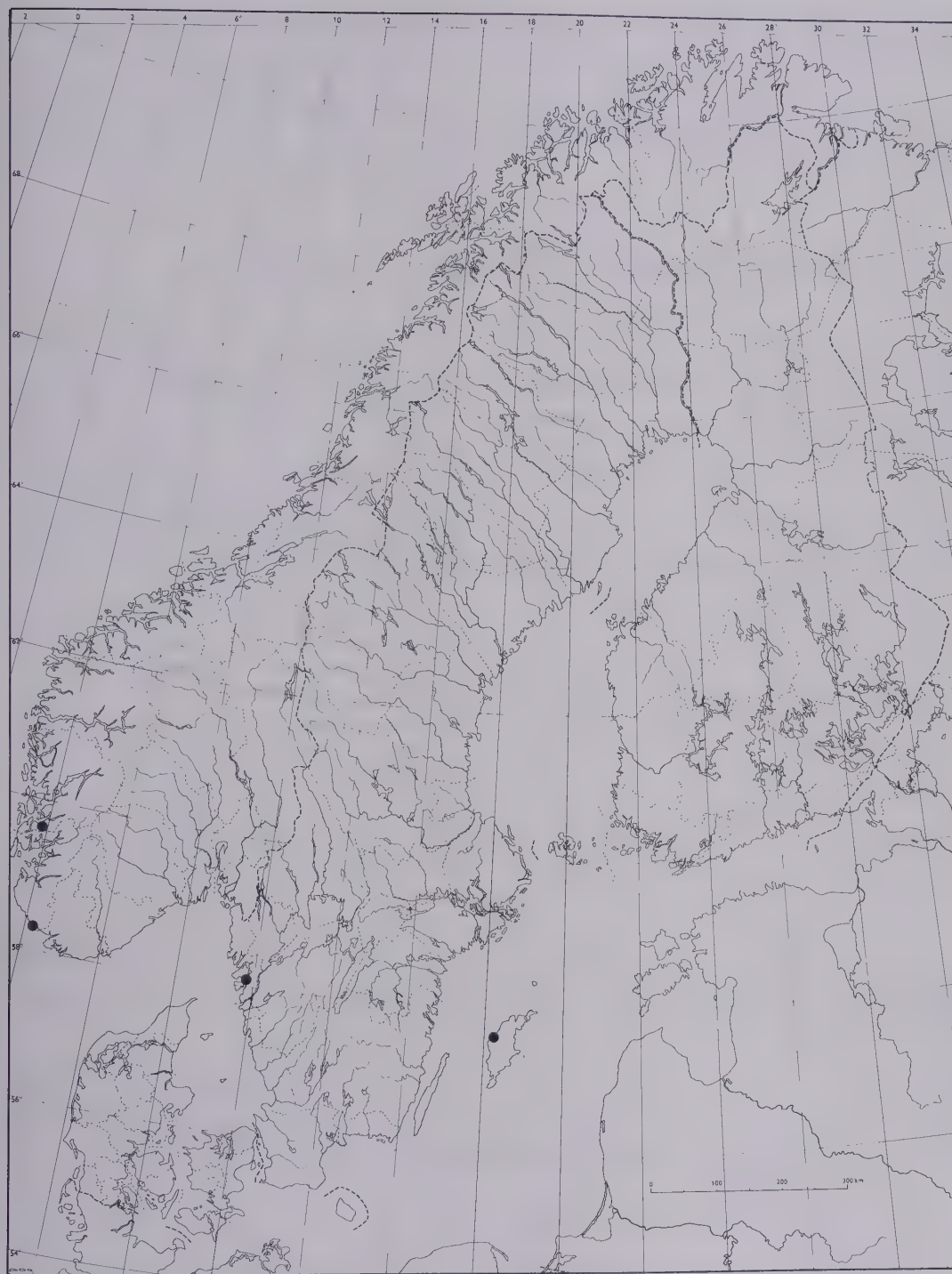


Fig. 35. *Physciopsis adglutinata*, Sweden, Gtl, 1918 Du Rietz (UPS).



Map 20. *Physciopsis adglutinata*

DISTRIBUTION AND HABITAT. From the very few records of *Ph. adglutinata* in Fennoscandia (Map 20) it is hard to judge its preferred habitat, but in the rest of Europe it is regarded as a southern species growing both on tree-trunks and rocks (cf. Lynge 1935: 184.)

REMARKS AND AFFINITIES. *Physciopsis adglutinata* has until recently been named *Physcia elaeina* (Sm.) A. L. Sm. (1918: 244) with *Lichen elaeinus* Sm. in Smith and Sowerby (1810: 2158) as the basionym. However, in the description of *L. elaeinus*, Smith cites *Parmelia elaeina* Wahlenb. in Ach. (1803 Suppl. p. 45) which according to the type material in UPS belongs to the genus *Vestergrenopsis*. The epithet *elaeina* has, therefore, to be restricted to that genus. A. L. Smith has also considered the above related but she probably had not seen the type material of *Parmelia elaeina*. The figure in English Botany could, without knowing the authentic material, fits both species.

Lecanora lepraeformis is here regarded as conspecific with *L. adglutinata* even though Floerke (l.c.) considered them as separate. Unfortunately the original material in B was destroyed during World War II, however, Lynge (1935: 182) had evidently seen authentic Floerke-material and regarded them as conspecific.

Because of the closely appressed thallus *Physciopsis adglutinata* is easily separated from all other species of *Physcia* s. lat. in Fennoscandia. Some small individuals of *Phaeophyscia orbicularis* may have the same appearance but they always have numerous well delimited rhizinae (see above) and consequently are not very closely appressed.

Ph. adglutinata was first discovered in Fennoscandia by Du Rietz (1923: 88) and is now known from three additional localities (Magnusson 1935: 123, Jörgensen 1972: 158 and below). It will probably be found in some new localities, especially in Norway, but there is no evidence that the species is overlooked in spite of its small size. Cf. also Degelius 1957: 473.

SECIMENS EXAMINED: Sweden: *Gtl*, Visby, 1918 Du Rietz (S, UPS, UPSV); 1932 Degelius (Degel, UPS); 1957 Degelius (GB). – *Bh*, Solberga churchyard, 1933 Magnusson 14088 (GB, S, UPS); 1938 Degelius (Degel, S, UPS); 1957 Degelius (GB); 1974 Moberg 2329 (UPS, herb. Mob.). – Norway: *Hrd*, Etne, Skånevik, 1968 Degelius (Degel). – *Rog*, Sokndal, Hauge, 1973 Dahl (O).

Physconia Poelt 1965: 30

Type species (Poelt 1965: 30): *Physconia pulverulenta* (Hoffm.) Poelt.

Physcia sect. *Sordulentae* subsect. *Brachysperma* ser. *Pulverulentae* Du Rietz 1925: 77. – *Physcia* subgen. (?) *Brachysperma* sect. *Pulverulenta* (Du Rietz) Lynge 1935: 152. – *Physcia* subgen. *Euphyscia* sect. *Brachysperma* subsect. *Pulverulenta* (Du Rietz) Maas G. 1952: 260. – *Physcia* subgen. *Euphyscia* sect. *Brachysperma* subsect. *Sordulenta* "group" *Pulverulenta* (Du Rietz) Thoms. 1963: 132. – Type species (sel. here): *Physconia pulverulenta* (Hoffm.) Poelt.

Thallus foliose, grey-brown to dark brown usually with a whitish pruina, lobate, loosely attached, rhizinae squarrose or rarely simple. Upper cortex thick, scleroplectenchymatous or paraplectenchymatous; lower cortex prosoplectenchymatous, black and distinct or whitish and indistinct, rarely absent. Apothecia lecanorine, often with lobules on the margins, asci clavate, 8-spored, spores brown, 1-septate, usually more than 27 µm long and 15 µm broad (Fig. 12 E). Paraphyses simple or dichotomously branched, brown and thickened at apices.

Pycnidia ± immersed, pycnoconidia subcylindrical (Fig. 14), 4–7 × 1–2 µm.

Chemistry: several unknown lichen substances, no atranorin found.

According to the original description this genus differs from *Physcia* s. lat. in its spore type (Fig. 11A, B), larger size, stronger tendency to form pruina and absence of atranorin. Of these characters the spore type was regarded as the most important, an opinion supported by the present study. On the other hand Kashiwadani (1975: 53) regarded the structure of the upper cortex to be more significant and because *Physconia grisea*,

according to him, differs in that respect from the other species, it was not treated within the genus *Physconia*.

As already pointed out by Poelt (1966), and substantiated in the present investigation, there are various types of upper cortex within the genus. The two types, paraplectenchymatous and scleroplectenchymatous, are described above (see chapter Thallus). The first type has been found in *Physconia enteroxantha*, *Ph. grisea* and *Ph. muscigena* (Fig. 36 C, E and D respectively) and the second type in *Ph. deterosa*, *Ph. perisidiosa* and *Ph. pulverulenta* (Fig. 36 A, F and B respectively). Except for the different terminology, these findings agree fairly well with those of Poelt (1966: 109). Kashiwadani's treatment of *Ph. grisea* apart from *Physconia* on the basis of a different cortical structure is consequently not supported. However, *Ph. grisea* does differ from the other species treated in having $\pm$ simple rhizinae and a whitish lower side and, accordingly, Poelt (1966: 119) separated this species into a

series of its own. This separation is also supported by differences in chemistry (see chapter Chemistry and the different species) and the infrageneric rank has been changed in accordance with the treatment of the genus *Physcia*.

Key to the sections

- Rhizinae squarrose sect. *Physconia* p.
Rhizinae $\pm$ simple sect. *Grisea* p.

Section *Physconia*

Type species: *Physconia pulverulenta* (Hoffm.) Poelt.

This section is characterized by the black underside in central parts and the squarrose rhizinae.

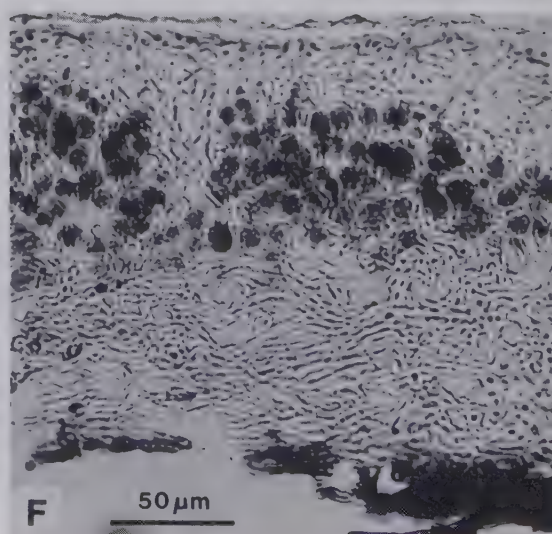
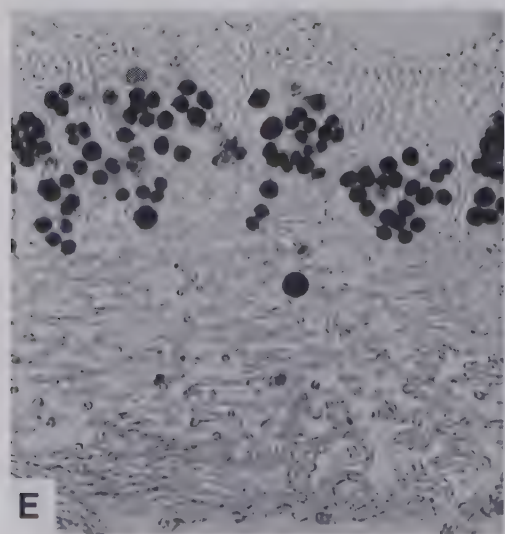
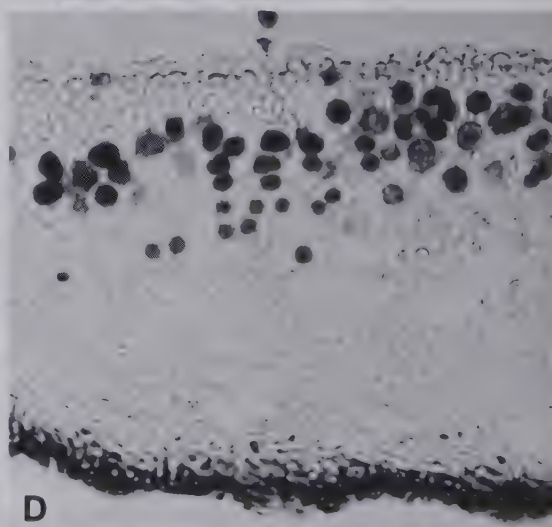
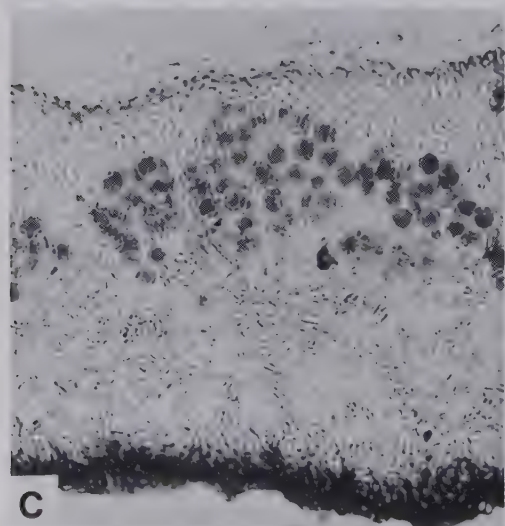
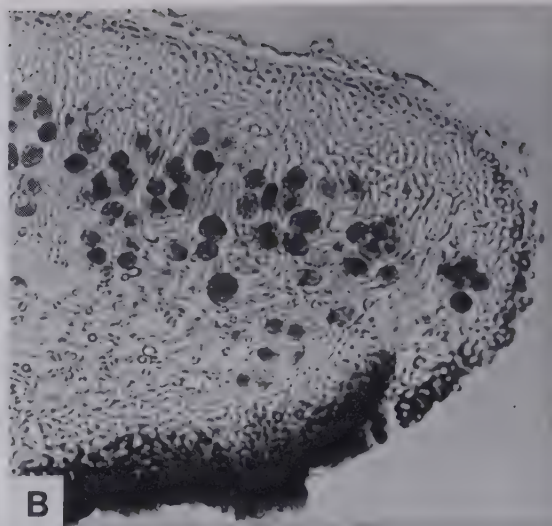
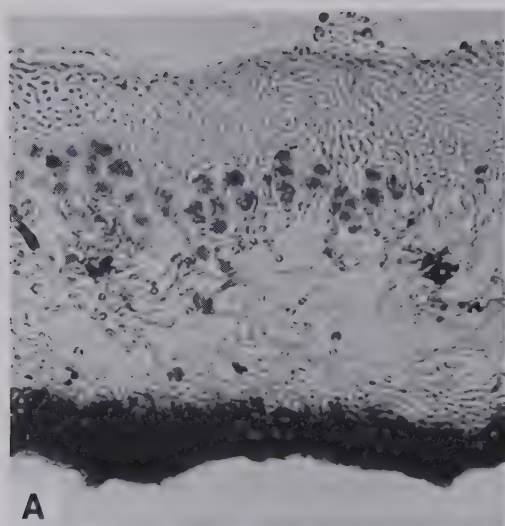
Physconia deterosa (Nyl.) Poelt 1965: 30

Fig. 37, Map 21

Parmelia pulverulenta var. *deterosa* Nyl. 1860: r20. –
Physcia deterosa (Nyl.) Nyl. 1878: 344. – Lectotype

Table 5. Comparison of the sorediate species of Section *Physconia*.

	<i>Ph. deterosa</i>	<i>Ph. perisidiosa</i>	<i>Ph. enteroxantha</i>
lobes	elongated and broad	short and narrow	elongated and broad
upper side	shining	shining	dull
soralia	marginal, bluish	lip-shaped, bluish	marginal, yellowish
lower side of lobes	black or brown to the tips	white at the tips (cortex absent)	black or brown, rarely whitish at the tips (cortex present)
upper cortex	scleroplectenchymatous	scleroplectenchymatous	paraplectenchymatous
lower cortex	present to the lobe-tips	absent at lobe-tips	present to the lobe-tips
medulla	white, K–	white, K–	yellow, K+ yellow
chemistry	no substances found	no substances found	substances found but unidentified



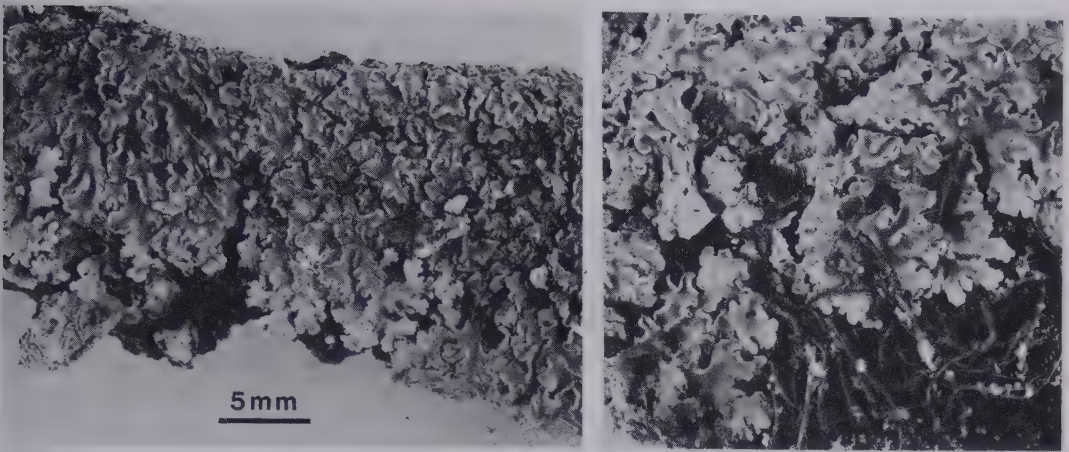


Fig. 37. *Physconia detersa*, Räs. Lich. Fenn. exs. 243 (left, UPS), 921 (right, LD).

(Poelt 1966: 124): Finlandia orient. Nylander (H, herb. Nyl. n. 32402. N.B. wrong cited by Poelt as n. 32420).

Parmelia pulverulenta β *leucoleiptes* Tuck. 1847: 224. – *Physcia leucoleiptes* (Tuck.) Lett. 1912: 254. – Lectotype (sel. here): North America, Cambridge, 1837 E. Tuckerman (FH, herb. Tuck.).

Physcia pulverulenta ***farrea* f. *subnitens* Vain. 1881: 132. – *Physcia grisea* f. *subnitens* (Vain.) Räs. 1921: 168. – Lectotype (Vitikainen 1968: 4): Finland, Karelia borealis, Nurmee, Porosaari, 1875 Vainio (TUR, herb. Vain. n. 8491). Isolectotype TUR (herb. Vain. n. 8492).

Physcia lanuginosa var. *pannarioides* Räs. 1939: 101. – Lectotype (Vitikainen 1968: 4): U.S.S.R., Hiitola, Pekonlahti, Hiidenvuori, 1936 Räsänen (H).

Thallus orbicular or irregular, up to 6 cm across, bright grey brown to dark brown, occasionally with a whitish or bluish pruina. Lobes elongated and appressed, up to 3 mm broad, distinctly separated or overlapping. Soralia marginal, seldom reaching the very lobe tips, usually with a bluish tinge. Underside black to the very tips, with black squarrose rhizinae. Upper cortex scleroplectenchymatous (Fig. 36A); medulla white; lower cortex prosoplectenchymatous and black, both corti exceptionally thick.

Apothecia rare, sorediate at the margins, up to 3 mm across. Spores 27–32(–35) $\times$ (13–)16–20 μ m.

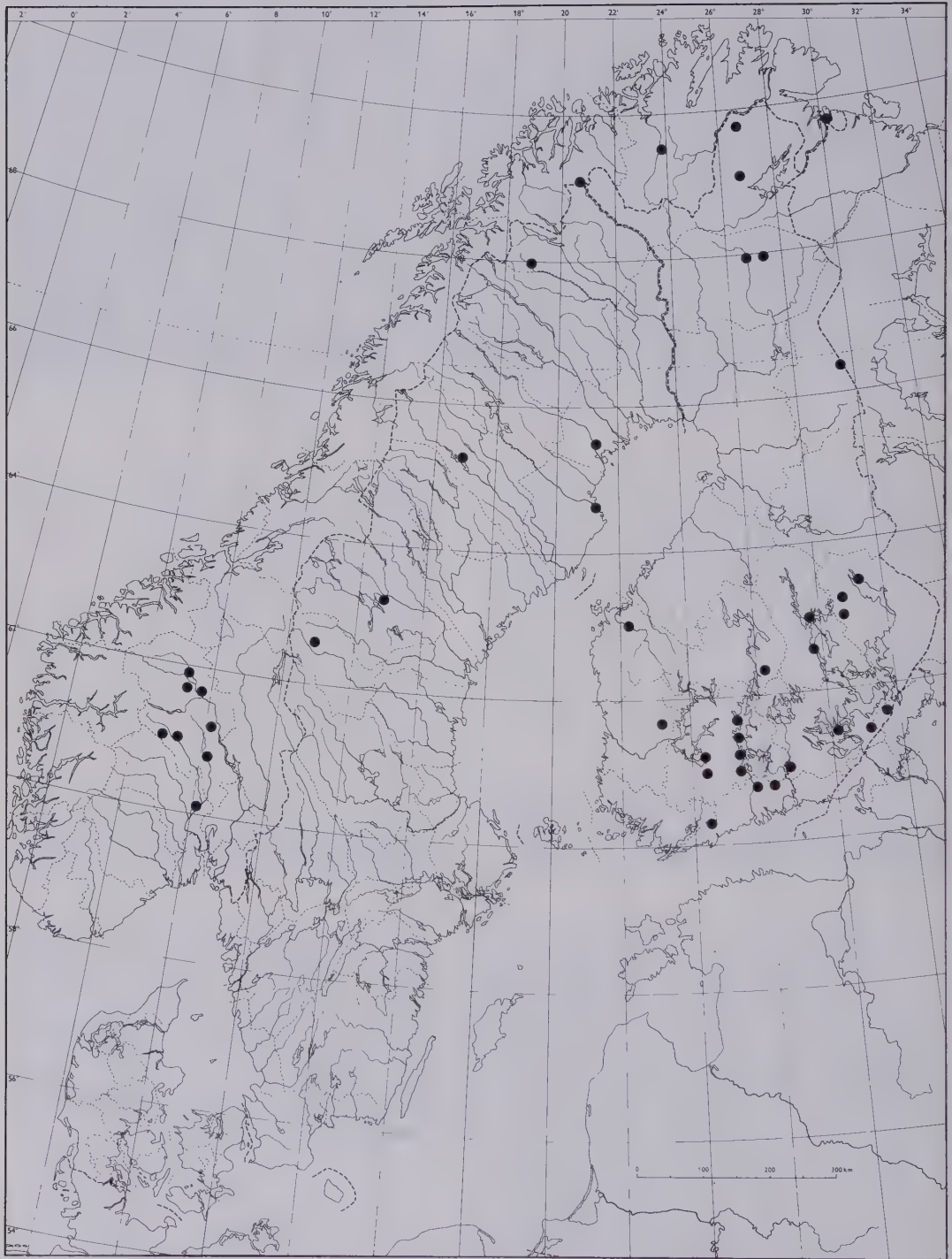
Pycnidia $\pm$ immersed, pycnoconidia, 4–6 $\times$ 1 μ m.

Chemistry: no lichen substances found.

Short characterization: middle-sized, brightly brownish, pruina bluish. Soralia marginal, bluish. Underside black with squarrose rhizinae. Medulla white. On moss-covered rocks or trees. Rare.

DISTRIBUTION AND HABITAT. *Ph. detersa* is a rare species in the area examined and its distribution is mainly restricted to the northeastern part (Map 21). Outside Fennoscandia it is reported from Central Europe and North America (Poelt l.c. and Thomson 1963). It has been found growing both on mossy rocks in steep slopes and tree-trunks in Fennoscandia but is reported as mainly growing on trees in Central Europe and North America. The distribution in Eastern Fennoscandia has previously been mapped by Vitikainen (1968).

Fig. 36. Longitudinal sections of lobes of different *Physconia* species showing various cortical structures. A. *Physconia detersa*, Sweden, Vb, 1945 Ahlner (UPS). B. *Physconia pulverulenta*, Sweden, Dlr, Moberg 1153b (UPS, herb. Mob.). C. *Physconia ecteroxantha*, Sweden, Upl, 1926 Degelius (UPS). D. *Physconia muscigena*, Sweden, Hrl, Moberg 1008 (UPS). E. *Physconia grisea*, Sweden, Sk, Santesson 24302 (UPS). F. *Physconia perisidiosa*, Sweden, Upl, 1926 Degelius (UPS).



Map 21. *Physconia detersa*

Symb. Bot. Upsal. XXII:1

REMARKS AND AFFINITIES. This rare species was almost overlooked in Fennoscandia before the treatment of the genus *Physconia* by Poelt (1966). The species concept was quite changed from the earlier known (Poelt 1957: 275) and in the light of this change the species was examined in Eastern Fennoscandia by Vitikainen (1968).

As there seem to be some difficulties in separating the sorediate species of the section *Physconia* these species are compared in Table 5.

Of the differences or similarities between *Ph. detera* and the other two species, those concerning the cortical structure and chemistry are considered to be the most significant ones. *Ph. detera*, is therefore, believed to be more closely related to *Ph. perisidiosa* than to *Ph. enteroxantha* as proposed by Poelt (1966: 124). It is concluded that *Ph. detera* is also closely related to *Ph. pulverulenta* (morphologically and chemically) and together with *Ph. perisidiosa* these three species form a well delimited group within the genus *Physconia* in Fennoscandia.

EXSICCATA EXAMINED: Norrlin & Nylander, Herb. lich. Fenn. 213 (C, H, LD). – Räsänen, Lich. Fenn. 89 (C), 243 (H, UPS), 921 (C, H, KUO, LD, S, TUR, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. Ång. 1. – *Hrj*, 5. – *Jmt*, 1. – *Vb*, 2. – *Nb*, 1. – *LyL*, 2. – *TL*, 1. – **Norway.** *Opl*, 17. – *Busk*, 1. – *Fnm*, 2. – **Finland.** *Nyl*, 4. – *St*, 1. – *Ta*, 8. – *Sa*, 3. – *Oa*, 1. – *Tb*, 1. – *Sb*, 2. – *Kb*, 3. – *Ks*, 1. – *Lk*, 1. – *Le*, 1. – *Li*, 2.

Physconia enteroxantha (Nyl.) Poelt 1966: 125

Fig. 38, 7, Map 22

Physcia enteroxantha Nyl. 1873: 196. – Holotype: France, Pyrenaeis orientibus, Collioure, prope Portum Veneris, 1872 Nylander (H, herb. Nyl. n. 32398).

Parmelia farrea β *alphiphora* Ach. 1810: 476. – Holotype: Sweden (H, herb. Ach. n. 1412, see Appendix Plate I).

Physcia subdetera Nyl. 1878: 344. – Lectotype (Poelt 1966: 124): Finlandia orient., Nylander (H, herb. Nyl. n. 32402, N.B. wrong cited by Poelt as 32420).

Physcia grisea var. *detera* f. *caesiella* Erichs. 1930: 55. – Holotype: Germany, Stormarn, Poppenbüttel, Alsterschleuse, 1922 Erichsen (HBG).

Physcia deterella Nädv. 1947: 121. – Holotype: USSR, Karelia ladogensis, Viborg, 1875 Vainio (PRM, herb. Suza).

Thallus usually irregular, seldom orbicular, up to 5 cm across, often confluent with other thalli, $\pm$ closely attached, grey-brown to brown, usually with a whitish pruina. Lobes overlapping or distinctly separated, up to 3 mm broad, seldom ascending at the tips. Soralia marginal, very seldom lip-shaped, sometimes eroding at the margins and covering laminal parts, yellowish. Underside brownish, sometimes black except for the brownish lobe-tips (corticate), covered with abundant black squarrose rhizinae which sometimes form a felty layer. Upper cortex of paraplectenchymatous type (Fig. 55 C); medulla yellowish; lower cortex prosoplectenchymatous.

Apothecia rare, usually with the margins dissolved into soralia. Spores (25–)28–37 $\times$ 16–21 μ m.

Pycnidia rare, $\pm$ immersed, pycnoconidia 4–6 $\times$ 1 μ m.

Chemistry: medulla K+ yellow. One unidentified lichen substance present.

Short characterization: middle-sized, brownish, more or less densely pruinose. Soralia marginal, yellowish. Underside black, lobe-tips brownish to whitish (corticate), rhizinae squarrose. Medulla yellowish, K+ yellow. Corticolous.

DISTRIBUTION AND HABITAT. *Physconia enteroxantha* is common on trunks of several deciduous, "rich bark" trees, particularly in open sites in the southern and central parts of Fennoscandia (Map 22). In the northern parts it usually grows on mossy rocks (cf. *Ph. perisidiosa*). Outside Fennoscandia it is reported to be common in the rest of Europe and is also reported from North America (Poelt l.c.). It is very often found growing mixed with *Ph. perisidiosa*. The distribution in Eastern Fennoscandia has previously been mapped by Vitikainen (1968).

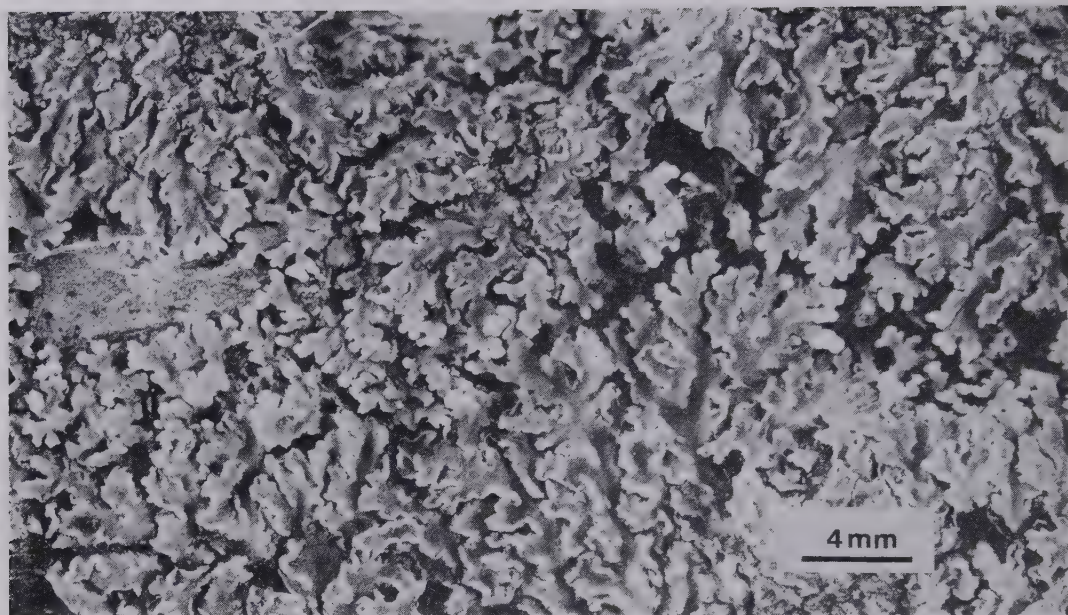


Fig. 38. *Physconia enteroxantha*, Räs. Lich. Fenn. exs. 243 (LD).

REMARKS AND AFFINITIES. *Ph. enteroxantha* was described by Nylander in "Observate lichenologica in Pyrenaeis orientalibus", a paper which was published three times. First as a series in Flora (Regensburg), I–II in 1872 and III–V in 1873, second in Bull. Soc. Linn. Norm. ser. 2, 6:256–328, 1873, and third as a separately paginated reprint of the second in 1873. *Ph. enteroxantha* appeared in part IV which dates from 1873 in all three publications but as part I–II was published in Flora before the others, Flora is also regarded as the original publication of part III–V.

Not until Poelt (1966) gave the revised taxonomy of the genus *Physconia* was there a clear delimitation of the species. Certainly Lynge (1935: 178) treated *Ph. enteroxantha* at species level, although it is obvious that his species concept was quite different as he regarded the species to be rare and restricted to South and South-western Europe.

The type material of *Physcia subdetersa* Nyl., separated from *Ph. deterosa* Nyl. by the yellow medulla and K+ yellow medulla reaction, is in-

cluded within the variation of *Physconia enteroxantha* (cf. Poelt 1966: 125). Also included is the type material of *Physcia deterosa* Nadv., even though the description specifies a white and K– medulla. Investigation by TLC gives the same spot as known from "normal" *Ph. enteroxantha* and the medulla also becomes weakly yellow with K.

The differences between *Physconia enteroxantha* and related sorediate species were discussed by Poelt (1966) and are summarized in Table 5 in connection with *Physconia deterosa*. From this table there seem to be distinct differences between *Ph. enteroxantha* and *Ph. perisidiosa* but narrow-lobed modifications of the former may sometimes have the same appearance as the latter. The differences between *Ph. enteroxantha* and *Ph. deterosa* seem to be very few and specimens of *Ph. enteroxantha* which have a weakly coloured medulla may be difficult to identify correctly. However, the differences in the upper cortex and chemistry are significant and a close examination of these characters will easily separate the species. *Physconia deterosa*



Map 22. *Physconia enteroxantha*

and *Ph. perisidiosa* are not regarded as closely related to *Ph. enteroxantha* mainly because of a different upper cortex and chemistry. It is probable that *Ph. muscigena* is more closely related, but the very special chemistry of *Ph. enteroxantha* gives it a more or less isolated position away from the other species of *Physconia* in the area examined. Cf. chapter Primary-secondary species.

EXSICCATA EXAMINED: Havaas, Lich. Norv. 456, 481 (BG, C, O, UPS). – Krypt, exs. Vind. 2780 (LD). – Malme, Lich. Suec. 604b (C, LD, S). – Norrlin & Nylander, Herb. lich. Fenn. 213 (BRA, UPS). – Räsänen, Lich. Fenn. 89 (BG, H, O, S, TUR, UPS), 95a, 95b (BG, C, H, S, TUR, UPS), 243 (BG, C, KUO, LD, S, TUR). – Räsänen & Hakulinen, Lichenoth. Fenn. 122 (H, KUO, LD, MIN, OULU, S, TUR, UPS), 913 (C, H, KUO, LD, OULU, TUR, UPS), 1159 (C, H, LD, OULU, TUR, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. *Sk*, 35. – *Bl*, 7. – *Sm*, 17. – *Öl*, 2. – *Gtl*, 2. – *Ög*, 12. – *Vg*, 72. – *Hl*, 3. – *Bh*, 24. – *Dls*, 9. – *Vrm*, 24. – *Nrk*, 6. – *Srm*, 50. – *Upl*, 74. – *Vsm*, 20. – *Dlr*, 20. – *Gstr*, 7. – *Hls*, 3. – *Mpd*, 11. – *Ång*, 1. – *Hrj*, 4. – *Jmt*, 9. – *Vb*, 2. – *ÅsL*, 2. – *LyL*, 3. – *TL*, 5. – **Norway.** *Östf*, 4. – *Akh*, 45. – *Hdm*, 3. – *Opl*, 29. – *Busk*, 3. – *Vestf*, 2. – *Tel*, 1. – *AuAgd*, 4. – *Rog*, 9. – *Hrd*, 11. – *SoFj*, 5. – *STrd*, 4. – *NTrd*, 10. – *Nrd*, 1. – *Trs*, 1. – *Fnm*, 6. – **Finland.** *Al*, 19. – *Ab*, 107. – *Nyl*, 156. – *Ka*, 6. – *St*, 14.

– *Ta*, 25. – *Sa*, 15. – *Kl*, 6. – *Oa*, 8. – *Tb*, 2. – *Sb*, 12. – *Kb*, 3. – *Om*, 2. – *Ob*, 6. – *Ks*, 1. – *Lk*, 2. – *Le*, 2. – *Li*, 5. – **Denmark.** *Jl*, 7. – *Fyn*, 2. – *Lang*, 2. – *Flst*, 1. – *Mön*, 2. – *Sj*, 38.

Physconia muscigena (Ach.) Poelt 1965: 30

Fig. 39, Map 23

Parmelia muscigena Ach. 1810: 472. – *Physcia muscigena* (Ach.) Nyl. 1857a: 107 and 1857b: 308. – Lectotype (sel. here): Switzerland, Salvan (H, herb. Ach. n. 1406, see Appendix Plate I).

Parmelia muscigena β *lenta* Ach. 1810: 473. – *Physcia muscigena* f. *lenta* (Ach.) Vain. 1881: 132. – Lectotype (sel. here): Switzerland (H, herb. Ach. n. 1407, see Appendix Plate I).

Parmelia muscigena γ *squarrosa* Ach. 1810: 473. – *Physcia muscigena* f. *squarrosa* (Ach.) Lynge 1916: 59. – Holotype: Scandinavia, Lapponia, Wahlenberg (H, herb. Ach. n. 1408, see Appendix Plate I).

Physcia muscigena f. *kotiluotoensis* Vain. in Räs. 1939: 100. – Lectotype (sel. here): USSR, Karelia ladogensis, Sortavala, Kotiluoto, 1923 Vainio (TUR, herb. Vain. n. 34502). Isolectotype TUR (herb. Vain. n. 34503).

Lichen muscigenus β *glaucescens* Wahlenb. 1812: 423. – Illeg. superfluous name (*Parmelia muscigena* γ *squarrosa* Ach.).

Thallus irregular, usually up to 10 cm across, frequently confluent with other thalli and cover-

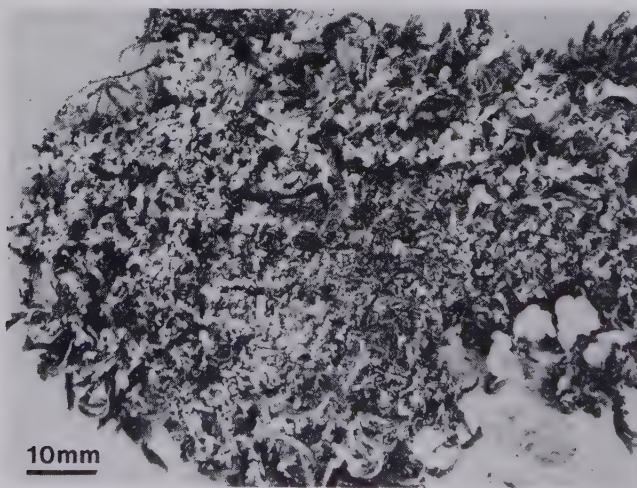


Fig. 39. *Physconia muscigena*, Sweden, Hrj, Moberg 1013 (left), TL, Moberg 747 (right, both UPS, herb. Mob.).



Map 23. *Physcia muscigena*

Symb. Bot. Upsal. XXII:1

ing large areas, loosely attached, pale brown to dark brown, often with a whitish sometimes very dense pruina. Lobes up to 3 mm broad, often narrower, and usually ascending. Underside black except at the brownish lobe-ends, with black squarrose rhizinae. Upper cortex paraplectenchymatous (Fig. 36D); medulla white; lower cortex prosoplectenchymatous.

Apothecia of variable size, up to 5 mm across, usually with lobules on the margins, seldom with rhizinae on the underside. Spores $23\text{--}32$ (~ 35) $\times 12\text{--}16$ μm .

Pycnidia immersed, pycnoconidia $4\text{--}6 \times 1$ μm .

Chemistry: no lichen substances found.

Short characterization: middle-sized, brownish with a dense whitish pruina. Lobes ascending without soralia and isidia. Apothecia $\pm$ common, frequent with secondary lobes. Among mosses on the ground.

DISTRIBUTION AND HABITAT. *Physconia muscigena* has a mainly alpine distribution in Fennoscandia, and outside this region it is restricted to areas with calcareous bedrock (Map 23), a distribution rather similar to that of *Thamnolia vermicularis* s. lat. in Fennoscandia. It mainly grows among mosses directly on the ground or may be found amongst the moss-cover of rocks. The distribution in Eastern Fennoscandia has previously been mapped by Hakulinen (1966: 190).

REMARKS AND AFFINITIES. *Physconia muscigena* is a very variable species and many extreme modifications have been described as separate taxa. For instance, the heavily pruinose type has been called "lenta", those with dense ascending lobes "squarrosa" and the more appressed type "kotiluotoensis". However none of these modifications and other listed intraspecific names can be given any taxonomic rank. *Physcia muscigena* var. *isidiata* Lynge (1916: 59) is a synonym of *Parmelia infumata* Nyl.

From general appearance, specimens of *Physconia muscigena* are usually easily separated from *Ph. pulverulenta* but it can be difficult to

identify extreme modifications. However, by examination of the upper cortex such specimens are easily determined, because *Ph. pulverulenta* has a scleroplectenchymatous (Fig. 36B) and *Ph. muscigena* a paraplectenchymatous upper cortex (Fig. 36D). From the other species of *Physconia* in Fennoscandia *Ph. muscigena* is easily separated by the absence of soralia. The most closely related species is probably *Ph. enteroxantha* (cf. *Ph. enteroxantha*).

EXSICCATA EXAMINED: Havaas, Lich. Norv. 626 (BG, C, UPS). – Malme, Lich. Suec. 837A, (C, LD, S, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 551, 552, 553 (C, H, LD, UPS). – Räsänen, Lich. Fenn. 99 (BG, C, H, KUO, S, TUR, UPS), 440 (BG, H, KUO, LD, S, TUR, UPS), 605 (C, H, KUO, LD, S, TUR, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 565 (C, H, KUO, LD, OULU, S, TUR, UPS), 1282 (C, H, LD, OULU, TUR, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. Ö1, 33. – Gtl, 15. – Dlr, 1. – Hrj, 23. – Jmt, 13. – Vb, 3. – ÅsL, 6. – LyL, 9. – PL, 6. – LL, 9. – TL, 64. – **Norway.** Akh, 18. – Hdm, 6. – Opl, 62. – Tel, 1. – Rog, 1. – Hrd, 2. – SoFj, 2. – NTrd, 1. – Nrd, 15. – Trs, 28. – Fnm, 66. – **Finland.** Al, 1. – Kb, 1. – Ob, 4. – Ks, 38. – Lk, 12. – Le, 37. – Li, 14.

***Physconia perisidiosa* (Erichs.) Moberg comb. nov.**

Fig. 40, 5F, Map 24

Physcia perisidiosa Erichs. 1930: 57. – Lectotype (sel. here): Germany, Schleswig-Holstein, Kr. Lauenburg, Siebenbäumen, Gut Castorf, 1916 Erichsen (HBG).

Physcia pulverulenta ***farrea* f. *semifarrea* Vain. 1881: 132. – *Physcia grisea* var. *semifarrea* (Vain) Lynge. 1916: 67. – Lectotype (sel. here): Finland, Kuusamo, Paanajärvi, Mäntyjoki, Vainio (TUR, herb. Vain. n. 8497).

Physconia farrea auct. (non *Parmelia farrea* Ach. = *Physconia grisea*).

Thallus small, seldom more than 2 cm across, $\pm$ loosely attached, usually dark brown and shining, often with a whitish or bluish pruina. Lobes mostly narrow (0.5–1 mm) and short, marginal lobes usually with downwardly bent tips and without soralia. Central lobes ascending, with

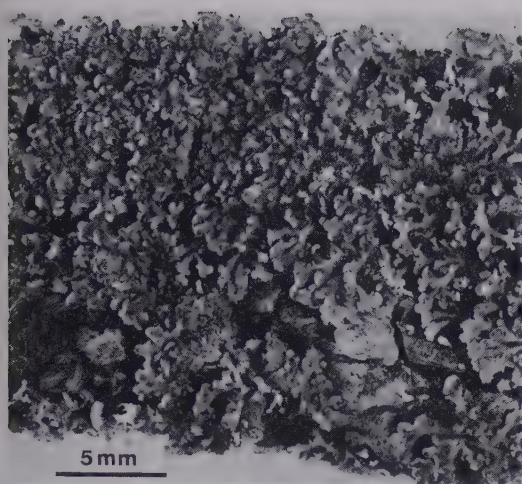


Fig. 40. *Physconia perisidiosa*, Räs. & Hakul. Lichenoth. Fenn. 563 (UPS).

lip-shaped bluish soralia. Sometimes the soredia become isidia-like in central parts. Underside whitish at the lobe-tips (lack of cortex, see below), becoming darker towards the centre; rhizinae squarrose and black. Upper cortex scleroplectenchymatous (Fig. 55 F); medulla white; lower cortex absent at the lobe-tips, prosoplectenchymatous in inner parts.

Apothecia rare, margins not dissolved into soralia, occasionally lobulate with lip-shaped soralia. Spores (24–)28–35 × 16–21 μm .

Pycnidia rare, immersed; pycnoconidia 4–6 × 1 μm .

Chemistry: no lichen substances found.

Short characterization: small-sized and narrow-lobed. Lobes in central parts ascending with lip-shaped soralia. Underside of lobe-tips whitish. Mainly corticolous.

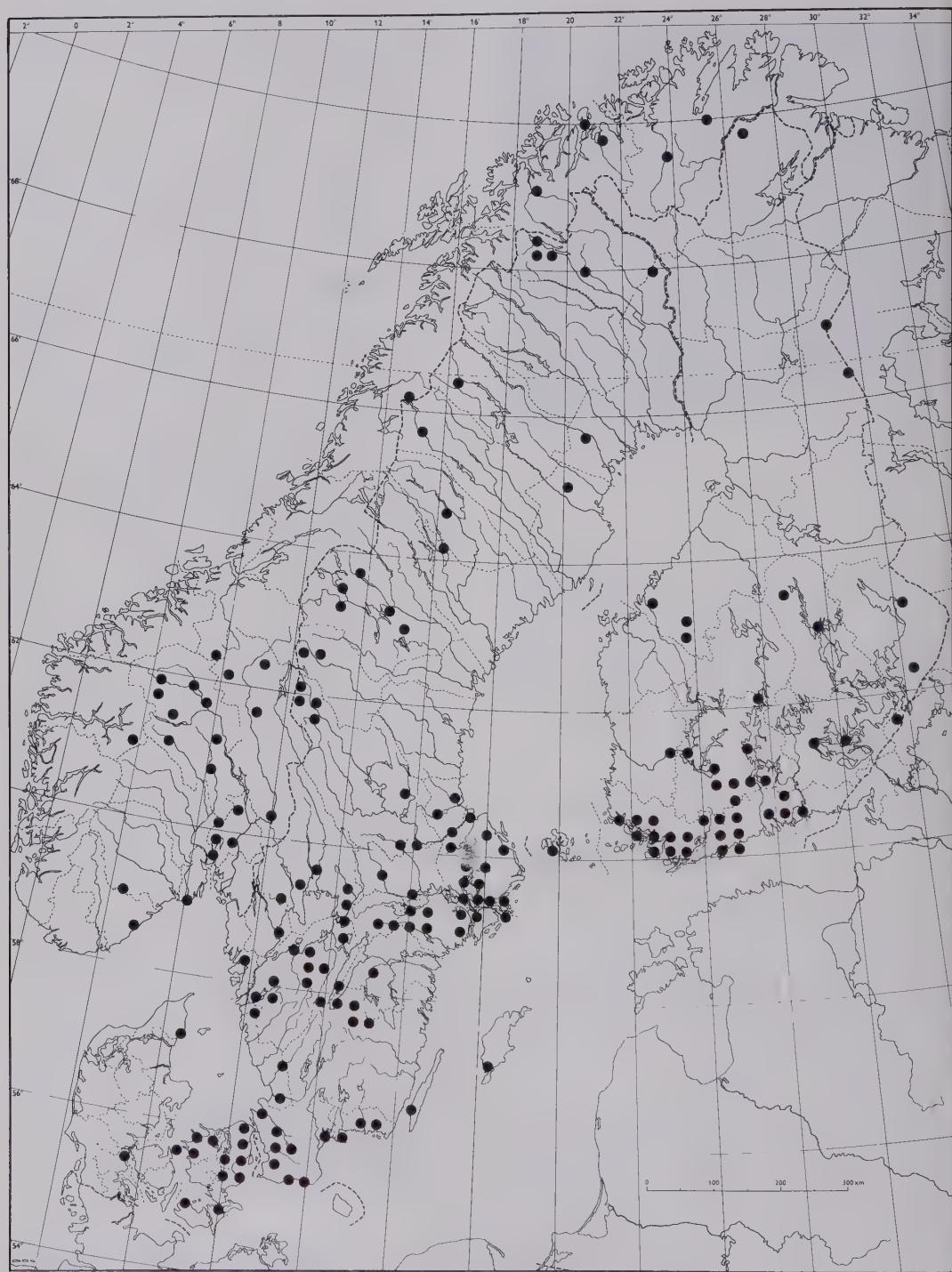
DISTRIBUTION AND HABITAT. *Ph. perisidiosa* is scattered throughout Fennoscandia, but is common only in the southern and central lowland regions (Map 24). It is mainly a corticolous species on trunks of various deciduous trees particularly those with a bark pH of more than 5 (i.e. richbark, cf. Du Rietz 1945: 147). In the northern range, where such substrata are rare, it

prefers mossy rocks on southerly exposed steep slopes. The distribution in Eastern Fennoscandia has previously been mapped by Vitikainen (1968).

REMARKS AND AFFINITIES. This species has usually been connected with the name *Physconia farrea* (Poelt 1965; 1966) but, as later discussed in connection with *Physconia grisea*, there is no material in the original collection in Acharius' herbarium which agrees with the interpretation of Poelt (cf. also Vitikainen 1968: 5). *Ph. farrea* has, therefore, been typified in the sense of the original description and treated as a synonym of *Physconia grisea*. The first name at species level used in the sense of Poelt seems to be *Physcia perisidiosa*. The type material is not very well developed but as it could hardly be regarded as a monstrosity (cf. Poelt 1966: 130) the new name of the "well-known" species is *Physconia perisidiosa*. Clearly this species was widely misunderstood prior to the treatment of Poelt, and although some form – or variety – names may have been used, no earlier author seems to have been quite aware of its distinction from related taxa or realized its abundance.

Its relations to the other sorediate species within the genus was discussed in connection with *Ph. deterosa* and *Ph. enteroxantha* and the most closely related species in Fennoscandia is considered to be *Ph. deterosa*. However, in southern Europe there is a species named *Physconia venusta* (Ach.) Poelt which seems to be very closely related to *Ph. perisidiosa*. It has the same narrow lobes, glossy upper side and whitish underside of the lobe-tips as *Ph. perisidiosa*, from which it is separated by the presence of apothecia and absence of soralia. As discussed earlier these two species are regarded as primary-secondary species. Some Fennoscandian material has been determined as *Physcia pulverulenta* var. *venusta* but such material has proved to be nothing but *Physconia pulverulenta*.

EXSICCATA EXAMINED: Fries, Lich. Suec. 204 (LD, S, UPS). – Magnusson, Lich. sel. 415 (LD, S, UPS). – Malme, Lich. Suec. 604b (UPS), 839 (C, LD, S,



Map 24. *Physconia perisidiosa*

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UPS). – Norrlin & Nylander, *Herb. lich. Fenn.* 214, 554 (C, H, LD, UPS), 555 (H, LD, O, UPS). – Räsänen, *Lich. Fenn.* 603 (H, KUO, LD, S, TUR, UPS). – Räsänen & Hakulinen, *Lichenoth. Fenn.* 64 (H, KUO, LD, MIN, OULU, S, TUR, UPS), 563 (C, H, KUO, LD, OULU, S, TUR, UPS). – Zwack-Holzhausen *Lich. exs.* 1044 (S, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. *Sk.* 16. – *Bl.* 4. – *Sm.* 14. – *Öl.* 1. – *Gtl.* 1. – *Ög.* 1. – *Vg.* 16. – *Hl.* 1. – *Bh.* 1. – *Dls.* 2. – *Vrm.* 6. – *Nrk.* 4. – *Srm.* 18. – *Upl.* 30. – *Vsm.* 12. – *Dlr.* 7. *Gstr.* 4. – *Hrj.* 7. – *Jmt.* 19. – *Vb.* 1. – *Nb.* 2. – *ÅsL.* 3. – *LyL.* 3. – *PL.* 1. – *TL.* 6. – **Norway.** *Östf.* 1. – *Akh.* 8. – *Hdm.* 4. – *Opl.* 21. – *Vestf.* 4. – *Tel.* 2. – *AuAgd.* 1. – *SoFj.* 1. – *STrd.* 3. – *Trs.* 3. – *Fnm.* 5. – **Finland.** *Al.* 1. – *Ab.* 13. – *Nyl.* 13. – *St.* 1. – *Ta.* 10. – *Sa.* 4. – *Kl.* 2. – *Tb.* 1. – *Sb.* 6. – *Kb.* 3. – *Om.* 2. – *Ks.* 4. – *Li.* 5. – **Denmark.** *Jl.* 6. – *Fyn.* 1. – *Loll.* 1. – *Mön.* 1. – *Sj.* 28.

***Physconia pulverulenta* (Hoffm.) Poelt 1965: 30**
Fig. 41, Map 25

Squamaria pulverulenta Hoffm. 1790: 39. – *Physcia pulverulenta* (Hoffm.) Fűrnröhr 1839: 249. – Orig. coll.: Germany, Erlangen. Probably lost. – Neotype (sel. here): Germany, Floerke, *Deutsche Lich. n.* 172 (UPS).

Parmelia pulverulenta *αallochroa* Ehrh. ex Schaer. 1840: 445. – Lectotype (sel. here): Sweden, Uppsala Ehrh., Pl. Crypt. Linn. exs. n. 187 (BM).

Parmelia pulverulenta *βargyphaea* Ach. 1810: 474. – Lectotype (sel. here): France, Dufour (H, herb. Ach. n. 1374, see Appendix Plate I). Isolectotype UPS.

Physcia pulverulenta var. *allochroa* f. *dispersa* Erichs. 1930: 58. – Holotype: Germany, Schleswig, bei Rehnbergholz bei Satrup, 1917 Erichsen (HBG).

Lichen pulverulentus Schreb. 1771: 128. – Ileg. superfl. name (*Lichen orbicularis* Neck. 1768: 509).

Thallus orbicular, up to 15 cm across, usually loosely attached, grey-brown to dark brown, often with a dense whitish pruina. Lobes radiating, up to 4 mm broad, usually $\pm$ overlapping but occasionally distinctly separated. Underside black, with abundant black squarrose rhizinae which sometimes form a dense felt visible from the upper side. Upper cortex scleroplectenchymatous (Fig. 36B); medulla white; lower cortex prosoplectenchymatous and black.

Apothecia usually numerous, up to 5 mm across, mostly with secondary lobes on the margins. Spores (25–)27–38 $\times$ 13–20 μ m.

Pycnidia usually abundant, $\pm$ immersed, pycnoconidia 5–7 $\times$ 1–1.5 μ m.

Chemistry: no lichen substances found.

Short characterization: large-sized and broad-lobed, without soralia and isidia. Apothecia numerous, with abundant secondary lobes. Corticolous.

DISTRIBUTION AND HABITAT. *Physconia pulverulenta* is a common species in rich bark communities on various deciduous trees in South and Central Fennoscandia (Map 25). It becomes rarer in the northern parts where it is also found growing on mossy rocks on steep south-facing slopes (cf. *Ph. perisidiosa*).

REMARKS AND AFFINITIES. The epithet *pulverulenta* has usually been referred to Schreber but by the citation of *Lichen orbicularis* Neck., *Lichen pulverulentus* Schreber must be considered a superfluous name. However, the epithet *pulverulenta* in the combination *Squamaria pulverulenta* (Hoffmann l.c.) is according to the Code (Art. 72 Note) treated as new and the resultant combination in *Physconia* is *Ph. pulverulenta* (Hoffm.) Poelt.

The Hoffmann material on which the description was based has not been found and because the figure in connection with the description is not sufficient to act as the type, a neotype has been selected. The material of Floerke's *Deutsche Lich. n.* 172 at UPS agrees very well with the original description.

Ph. pulverulenta is very variable and many forms and varieties have been described. Those described on material from the area examined have been studied, and all are well accommodated within the known variation of the species.

Physconia pulverulenta is apparently most closely related to *Ph. deterosa* and *Ph. perisidiosa*, and with respect to morphology, the three species form a distinct "group" within the genus in Fennoscandia (cf. *Ph. deterosa*).

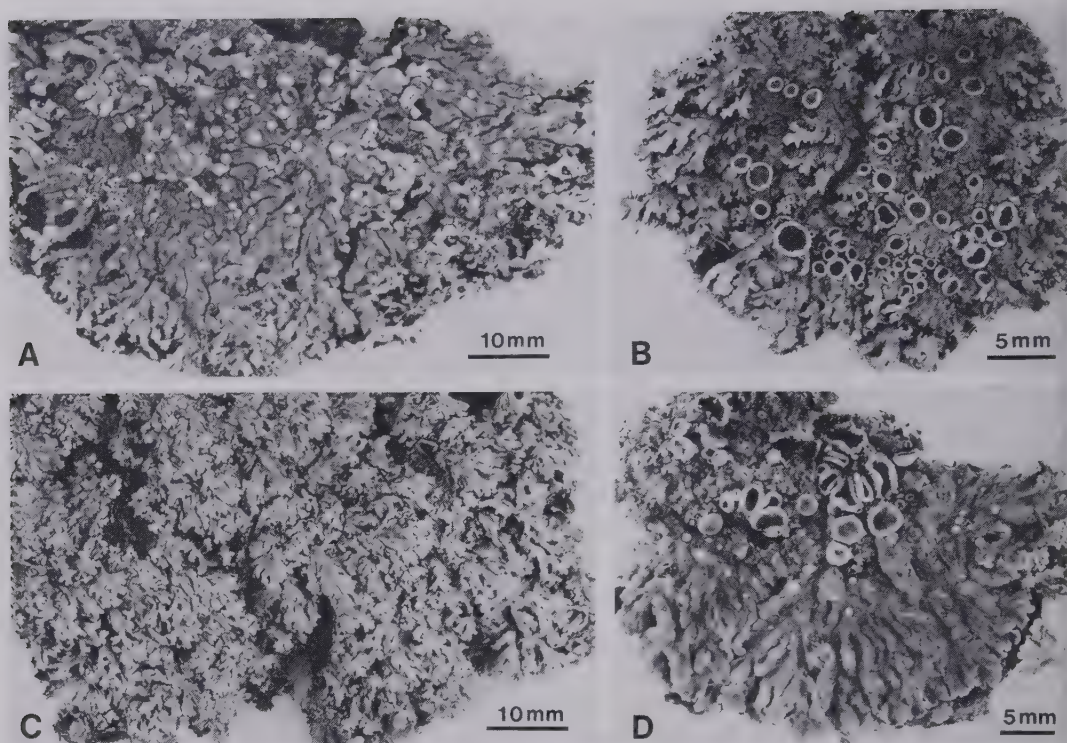


Fig. 41. *Physconia pulverulenta*. Various modifications. A. Sweden, Bh, Magnusson 4782 (UPS). B. Sweden, Nrk, 1900 Svedberg (UPS). C. Sweden, Vg, Santesson 14370 (UPS). D. Sweden, Upl, Lundqvist 8364 (UPS).

EXSICCATA EXAMINED: Ehrhart, Pl. crypt. Linn. 187 (BM). – Havaas, Lich. Norv. 107 (BG, C, O, UPS). – Malme, Lich. Suec. 180, 581 (C, LD, S, UPS). – Norrlin & Nylander, Herb. lich. Fenn. 212 (C, H, LD, UPS). – Räsänen, Lich. Fenn. 604 (H, KUO, LD, TUR, UPS). – Räsänen & Hakulinen, Lichenoth. Fenn. 484, 564 (H, KUO, LD, OULU, TUR, UPS), 1215 (C, H, LD, OULU, TUR, UPS). – Stenhammar, Lich. Suec. 72 (UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. Sk, 99. – Bl, 15. – Sm, 51. – Öl, 11. – Gtl, 18. – Ög, 13. – Vg, 143. – Hl, 22. – Bh, 75. – Dls, 51. – Vrm, 23. – Nrk, 57. – Srm, 68. – Upl, 115. – Vsm, 40. – Dlr, 18. – Gstr, 13. – Hls, 4. – Mpd, 11. – Ång, 4. – Hrr, 7. – Jmt, 11. – Vb, 3. – ÅsL, 3. – LyL, 1. – **Norway.** Östf, 17. – Akh, 107. – Hdm, 4. – Opl, 32. – Busk, 17. – Vestf, 33. – Tel, 16. – AuAgd, 9. – VAgd, 14. – Rog, 6. – Hrd, 27. – SoFj, 70. – MöRo, 7. – STrd, 9. – NTrd, 20. – Nrd, 11. – Trs, 26. – **Finland.** Al, 73. – Ab, 182. – Nyl, 216. – Ka, 6. – St, 31. – Ta, 64. – Sa, 12. – Oa, 16. – Tb,

4. – Sb, 10. – Kb, 3. – Om, 1. – Ok, 1. – Ob, 4. – **Denmark.** Jl, 29. – Fyn, 5. – Lang, 1. – Flst, 2. – Mön, 4. – Sj, 64. – Brnh, 24.

Section Griseae (Poelt) Moberg comb. nov.

Physconia ser. *Griseae* Poelt 1966: 119. – *Physcia* sect. *Grisea* (Poelt) Kashiwadani 1975: 53. – Type species: *Physcia grisea* (Lam.) Poelt.

This section is characterized by the simple or weakly branched (not squarrose) rhizinae and a chemistry quite different from sect. *Physconia*. The lichen substances have not yet been identified but are detected as spots by TLC. Cf. chapter Chemistry.



Map 25. *Physconia pulverulenta*

***Physconia grisea* (Lam.) Poelt 1965: 30**

Fig. 42, Map 26

Lichen griseus Lam. 1789: 480. – *Physcia grisea* (Lam.) Zahlbr. 1912: 177. – Holotype: Paris? In truncis arborum (P, herb. Lam.).

Lobaria pulveracea Hoffm. 1796: 153. – *Physcia pulveracea* (Hoffm.) Vain. 1896: 14. – Lectotype (sel. here): Germany, Hannoverae, Ehrh. Pl. Crypt. Linn. exs. n. 285 (BM, herb. Smith).

Parmelia farrea Ach. 1810: 475. – *Physcia farrea* (Ach.) Vain. 1881: 132. – *Physconia farrea* (Ach.) Poelt 1965: 30 (nomen non planta). – Lectotype (sel. here): England (H, herb. Ach. n. 1411, see Appendix Plate I).

Lichen pityreus Ach. 1798: 124. – Illeg. superfluous name (*Lobaria pulveracea* Hoffm.).

Thallus irregular or orbicular, up to 8 cm across, more or less closely attached, greyish to grey-brown with a whitish usually maculate pruina which sometimes covers the whole thallus but is usually restricted to the lobe-tips. Lobes mostly overlapping, radiating, up to 3 mm broad, the tips broadest and concave. Isidia granulated and becoming sorediate, marginal or laminal, sometimes covering central parts of the thallus. Underside whitish, in central parts light brown-

ish, with white to brownish, rarely blackish, simple rhizinae which have a slight tendency to become squarrose or branched at the tips. Upper cortex paraplectenchymatous (Fig. 36E), medulla white, lower cortex prosoplectenchymatous not distinctly separated from the medulla.

Apothecia not common, up to 3 mm across, with sorediate margins. Spores $27-34 \times 14-17 \mu\text{m}$.

Pycnidia immersed, pycnoconidia $4-7 \times 1-2 \mu\text{m}$.

Chemistry: colour reaction all negative. Four unidentified lichen substances found, different from other substances present in the genus.

Short characterization: broad-lobed, grey-brownish with maculiform pruina, isidiate to sorediate. Underside whitish, with whitish simple rhizinae. Corticolous.

DISTRIBUTION AND HABITAT. *Ph. grisea* has a southern distribution in Fennoscandia (Map 26) and is restricted to trunks of trees (rich bark) in open situations.

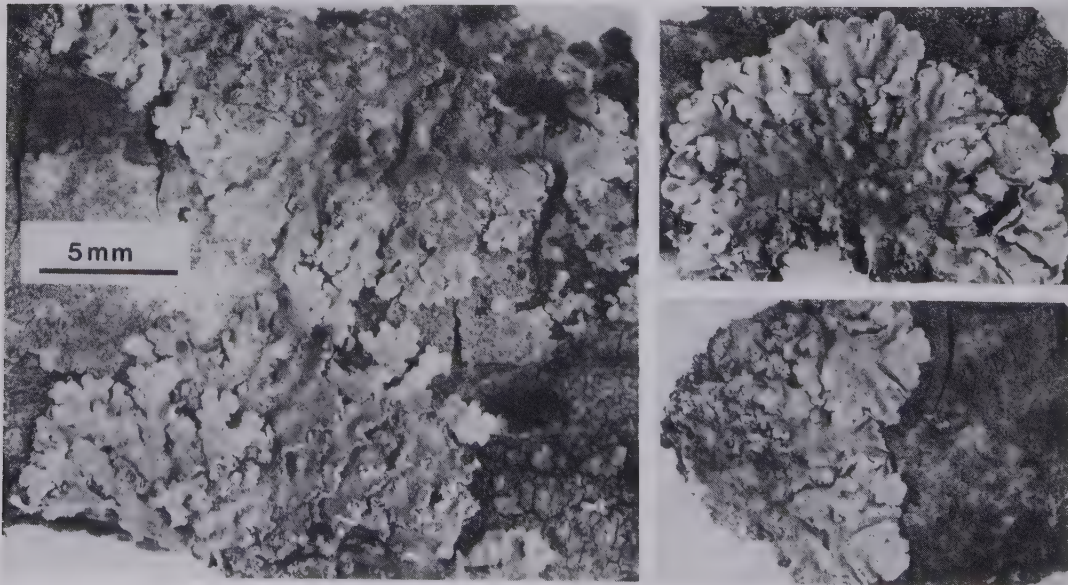


Fig. 42. *Physconia grisea*, Sweden, Hl, Magnusson 13805 (left, UPS), Vg, 1920 Vrang (both to the right, UPS).



Map 26. *Physconia grisea*

REMARKS AND AFFINITIES. The delimitation of this species was a matter of much confusion until Poelt (1966) proposed the new classification of the species within the genus *Physconia*. Unfortunately the name *Physconia farrea* was restricted to material which has no representative in the type material (H, herb. Ach.). *Parmelia farrea* was characterized by Acharius as "subtus albido" and the only material named by Acharius in Helsinki with a white underside is the lower left specimen (Appendix Plate I). Morphologically this is well accommodated within the known variation of *Ph. grisea* and chemical investigation (TLC) also support this statement. *Ph. farrea* has, therefore, to be considered a synonym of *Ph. grisea*.

Lobaria pulveracea, treated as *Physcia pulveracea* by Vainio, is according to the material of Ehrh. exs. n. 285 (BM) synonymous with *Ph. grisea*.

Lichen pityreus, treated as *Physcia pityrea* by Lamy (1878: 383), is a superfluous name of *Lobaria pulveracea* due to citation in the Acharian description.

As stated earlier *Ph. grisea* differs from the other species of the genus *Physconia* in its pale lower side, pale simple rhizinae and unusual chemistry. These differences are the reason for the treatment of the species in a section of its own. The proposal of Kashiwadani (1975: 53, *Ph. grisea* as a section of *Physcia*) is not supported.

EXSICCATA EXAMINED: Krypt. exs. Vind. 2780 (BG, C, GB, S, UPS). – Malme, Lich. Suec. 604a, 838 (C, LD, S, UPS).

SPECIMENS EXAMINED (lists with complete data in UPS and S):

Sweden. Sk, 52. – Bl, 2. – Sm, 1. – Öl, 4. – Gtl, 7. – Ög, 1. – Vg, 9. – Hl, 6. – Bh, 4. – Upl, 1. – Norway. VAgd, 1. – Denmark. Jl, 12. – Loll, 2. – Flst, 2. – Mön, 4. – Sj, 26. – Brnh, 4.

Excluded names

Lichen angustatus Hoffm. 1784: 77. – No authentic material on which the description was based has been localized. The description and figure does not clearly indicate any species of *Physcia* s. lat.

Physcia auraënsis Vain. in Räs. 1931: 136 – Nomen nudum.

Parmelia cyclozelis β *lithotea* Ach. 1803: 199 = *Parmeliopsis hyperopta* (Ach.) Arn.

Parmelia grisea (Hoffm.) Ach. 1803: 188 = *Pannaria hookeri* (Borr.) Nyl.

Physcia lanuginosa (Hoffm.) Vain. in Ahlq. 1928: 82. – No authentic material on which the description was based has been localized. The description and figure do not clearly indicate any species of *Physcia* s. lat.

Physcia lithotea (Ach.) Nyl. 1877: 354. – Nylander cites *Ph. lithotea* var. *sciastra* Ach. as the basionym but no such name seems to have been published. Nomen nudum in Nylander.

Physcia lithotea var. *sciastralla* Nyl. 1877: 354. – Nomen nudum.

Physcia parvula var. *lurida* Vain. in Norrl. et Nyl., Herb. Lich. Fenn. 557 (1921). – Nomen nudum.

Physcia pulverulenta **muscigena* f. *minuta* Vain. 1881: 132 = *Massalongia carnosa* (Dicks.) Körb. (det. P. M. Jørgensen 1975).

Physcia solenaria (Ach.) Duby 1830: 612 = *Teloschistes villosus* (Ach.) Norm.

APPENDIX

Type material of *Physcia* s. lat. in Acharius' herbarium in Helsinki (H), Finland.

In herb. Acharius in Helsinki (H) different specimens are as a rule glued together on small sheets. Sometimes it may be difficult to explain

which of the specimens is ment to be the type. Some sheets have thus been photographed and this material is reproduced in Plate I and II. The figures (1354, etc.) are in the running numbering of the whole herbarium and the inserted arrows are ment to point to the material concerned.

Explanation of the Plates.

Plate I

No. 1354. Lectotype of *Parmelia sciastra* = *Phaeophyscia sciastra*.

No. 1374. Lectotype of *Parmelia pulverulenta* var. *argyphaea* = *Physconia pulverulenta*.

No. 1378. Lectotype of *Parmelia aipolia* var. *acrita* = *Physcia aipolia*.

No. 1406. Lectotype of *Parmelia muscigena* = *Physconia muscigena*.

No. 1407. Lectotype of *Parmelia muscigena* var. *lenta* = *Physconia muscigena*.

No. 1408. Holotype of *Parmelia muscigena* var. *squarrosa* = *Physconia muscigena*.

No. 1411. Lectotype of *Parmelia farrea* = *Physconia grisea*.

No. 1412. Holotype of *Parmelia farrea* var. *aliphora* = *Physconia enteroxantha*.

No. 1428. Lectotype of *Parmelia stellaris* var. *adscendens* = *Physcia adscendens*.

No. 1431. Holotype of *Borreria tenella* var. *exemta* = *Physcia tenella*.

Plate II

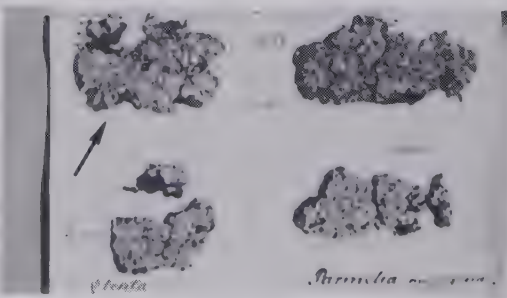
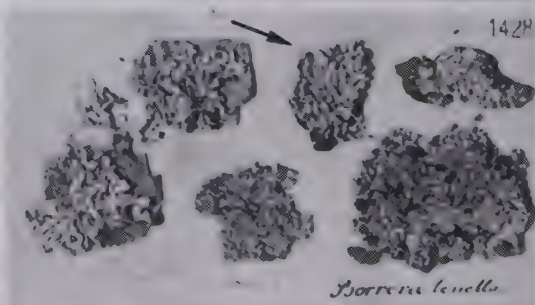
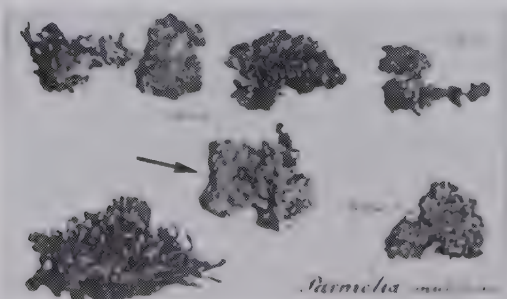
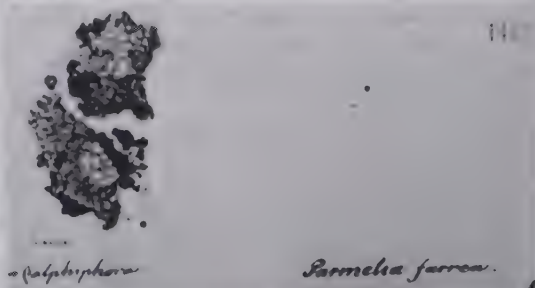
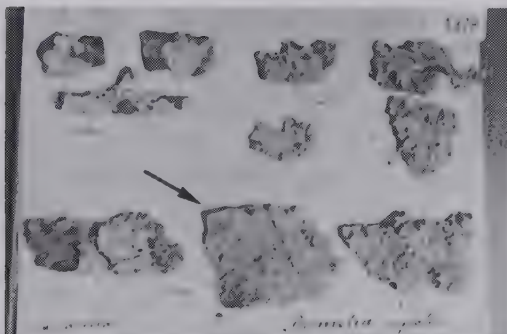
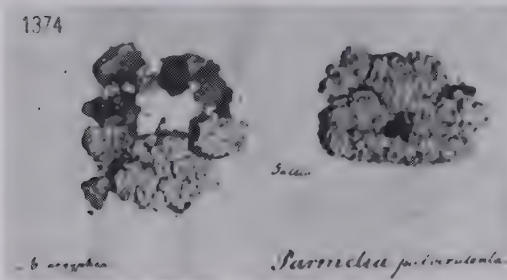
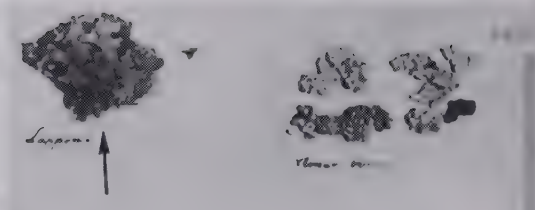
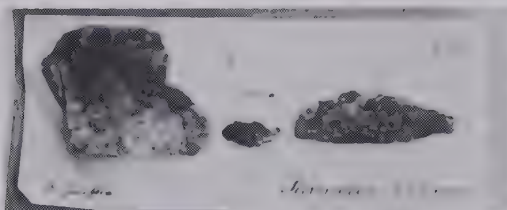
No. 1434. Lectotype of *Parmelia aipolia* var. *cercidia* = *Physcia aipolia*.

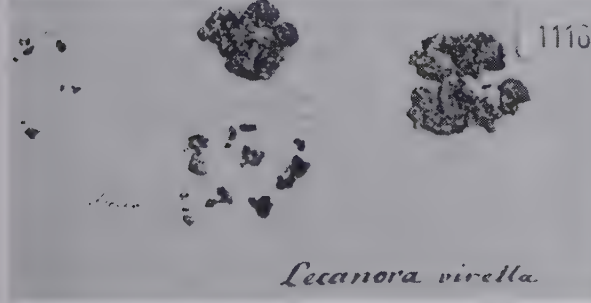
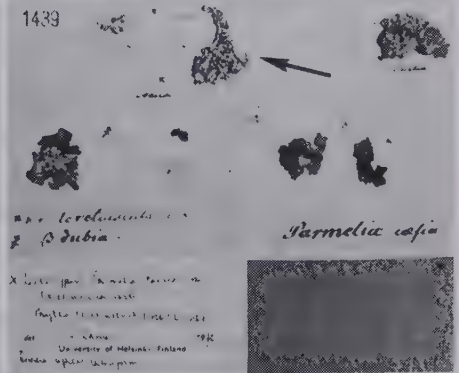
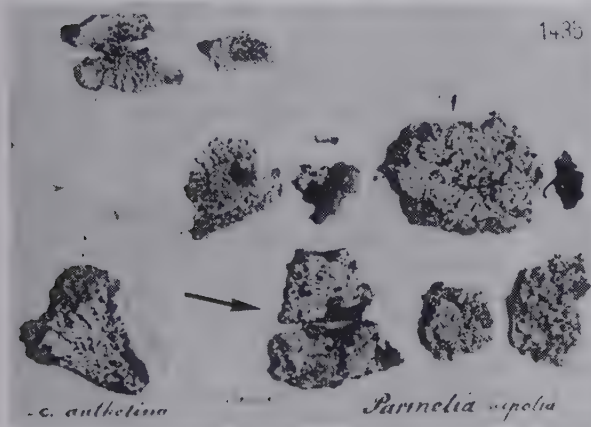
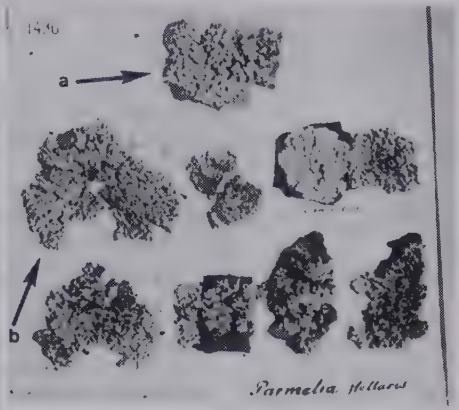
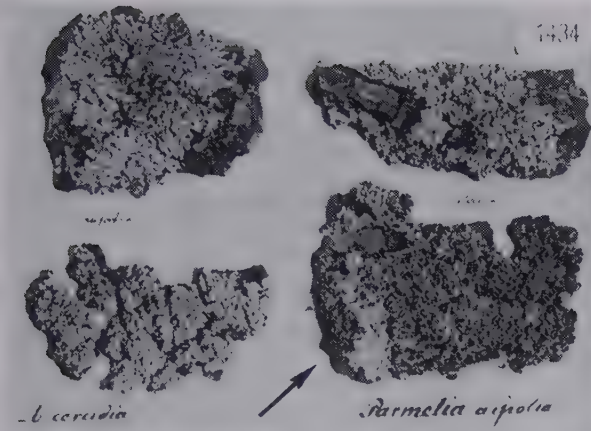
No. 1435. Lectotype of *Lichen anthelinus* = *Physcia aipolia*.

No. 1436. a. Lectotype of *Parmelia stellaris* var. *radiata* = *Physcia stellaris*. b. Lectotype of *Parmelia stellaris* var. *rosulata* = *Physcia stellaris*.

No. 1439. Lectotype of *Parmelia caesia* var. *teretiuscula* = *Physcia dubia*.

No. 1116. Lectotype of *Lichen virellus* = *Phaeophyscia orbicularis*.





X. Lichen spec. *Parmelia* *capia* in
 1881. *Lecanora* *virella*
 (Puffin. 1881. *Lecanora* *virella* 1881)
 det. *L. virella*
 University of Helsinki, Finland
 (Puffin. 1881. *Lecanora* *virella* 1881)

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